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PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF

Specifications

RELATING TO

RAILWAYS.

A.D. 1770—1863.

PRINTED BY ORDER OF THE COMMISSIONERS OF PATENTS.

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PREFACE.

THE Indexes to Patents are now so numerous and costly as to render their purchase inconvenient to a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of Invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Alphabetical, Subject-matter, and Reference Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the latter are sold have been added.

0 41 11-4-35.

The number of Specifications at this time printed and published amounts to nearly 61,000. A large proportion of the Specifications enrolled under the old law, previous to 1852, embrace several distinct Inventions, and many of those filed under the new law of 1852 indicate various applications of the single Invention to which the Patent is limited. Considering, therefore, the large number of Inventions and applications of Inventions to be separately dealt with, it cannot be doubted that several properly belonging to the group which forms the subject of this volume have been overlooked. In the progress of the whole work such omissions will from time to time become apparent, and be supplied in second or supplemental editions.

B. WOODCROFT.

January, 1868.

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RAILWAYS.

RAILWAYS.

A.D. 1770, February 5.—N° 953.

EDGEWORTH, Richard Lovell.—" Portable railway or " artificial road to move along with any carriage to which it is " applied."

" The invention consists in making portable railways to wheel " carriages, so that several pieces of wood are connected to the " carriage, which it moves in regular succession in such manner " that a sufficient length of railway is constantly at rest for the " wheels to roll upon, and that when the wheels have nearly " approched the extremity of this part of the railway their motion " shall lay down a fresh length of railway in front, the weight of " which, in its descent, shall assist in raising such part of the " rail as the wheels have already passed over, and thus the pieces " of wood which are taken up in the rear are in succession laid in " the front, so as to furnish constantly a railway for the wheels " to roll upon."

[Printed, 4*d.* No Drawings. See Rolls Chapel Reports, 6th Report, p. 160. Rolls Chapel.]

A.D. 1803, February 28.—N° 2682.

WOODHOUSE, Jonathan.—" A new method of forming a " cast-iron rail or plate which may be used in making iron rail- " roads or ways for the working and running of waggons, drays, " and other carriages on public and other roads; and also a new " method of fixing, fastening, and securing such cast-iron rail or " plate on such roads."

" The rail or plate is made of cast iron, and the upper part or " surface thereof is concave, the width of which rail or plate may " be increased or diminished as may best suit the size of the " wheels of the carriages that may be worked upon the particular

" roads where the rails or plates are used. The method of fixing, " fastening, and securing the cast-iron rails or plates is to place " them on bearings at convenient distances, which are to be fixed " firm and solid in the earth, and to fasten the rails or plates to " such bearings with wrought-iron screws or cutter bolts. The " bearings for the rails or plates may be made of timber, stone, " cast iron, or wood piles; and if the rails or plates are properly " fixed to such bearings with wrought-iron screws or cutter bolts, " and the road is made even with the surface of the external or " outer edges of the rails or plates, either with stone, gravel, or " wood, or any other road materials, the rails or plates will be " immoveable, and the wheels of the carriages used thereon will " pass over the same with facility, and by reason of the concave " form and manner of fixing of the said rails or plates no shock " which they can receive (except some wilful force is maliciously " used) can injure or break them."

[Printed, 1*s*. Drawings. Repertory of Arts, vol. 3 (*second series*), p. 15; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 383; Rolls Chapel Reports, 6th Report, p. 202. Rolls Chapel.]

A.D. 1811, March 4.—N° 3405.

GUPPY, SARAH, and GUPPY, SAMUEL.—" A new mode of " constructing and erecting bridges and railroads without arches " or sterlings, whereby the danger of their being washed away by " floods is avoided."

" On each side of the river or place over which a bridge or road " is to be constructed, pursuant to my said invention I do fix or " drive a row of piles, with suitable framing to connect them " together, and behind these I do fix or drive and connect other " piles or rows of piles and suitable framing, or otherwise. " Upon the banks of the said river or place I do dispose or build " certain masses of connected masonry or other ponderous structures, with piles or without, in order and to the end that the " said piles or masonry, or other structures, shall be capable of " sustaining and permanently resisting the action of a considerable force applied or exerted in directions tending to bring the " same together; and I pass across the said river or place, from " the upper or other convenient part of the said piles or masonry " or structure, several strong metallic chains, parallel to and at " suitable distances from each other, which said chains may be

" drawn tight by secure mechanical means; or otherwise the said " chains may be suffered to hang in similar lines, slightly curved, " from the one side or bank to the other; and in either case I do " dispose upon the said chains, longitudinally and crossways, " such fit pieces of timber or iron, or other suitable material, as " shall and may constitute a platform, which, by the connection " or disposition of the materials thereof, shall afford a proper " support for a road or pavement of the usual structure, or for " railroads; which last, namely, the railroads, upon such occasions " as may require the use and application of my said invention, I " do connect, unite, and frame together with each other and with " the chains herein-before mentioned and described."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 19 (*second series*), p. 215; Rolls Chapel Reports, 8th Report, p. 83. Rolls Chapel.]

A.D. 1812, December 30.—N° 3632.

CHAPMAN, William, and CHAPMAN, Edward Walton.—" A method or methods of facilitating the means and reducing " the expense of carriage on railways and other roads."

" The invention consists in the use of a chain or other flexible " and continuous substance stretched along the road to be travelled, properly secured at each end and at suitable intervals, " and in the application of this chain round or partially round a " barrel or grooved wheel in such a manner as not to slip; when " this grooved wheel, which is fixed upon, before, or behind " a carriage supporting or containing any internal self-moving " power, shall be put in motion by the said power, so that by the " revolution of the barrel or grooved wheel round its axis, either " one way or the other, draw the said carriage and any others " which may be attached to it within its powers of action. As " the carriage containing the motive power will, thus loaded, be " too heavy in various cases for the strength of the existing iron " or wooden rails if resting on four wheels only, so arranged for " such ways that it may rest equally and more freely round " curves or angles either on six or eight wheels, so as to reduce " its pressure on each in the inverse proportion of its number of " wheels."

[Printed, 1*s*. 2*d*. Drawings. See Repertoryof Arts, vol. 24 (*second series*) p. 129; also vol. 26 (*second series*), p. 161; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 396. Petty Bag.]

A.D. 1815, November 14.—N° 3959.

BAADER, Joseph de.—" An improved plan of constructing " railroads, and carriages to be used on such improved railroads, " for the more easy, convenient, and expeditious conveyance of " all sorts of goods, wares, merchandise, persons, and all other " articles usually or at any time removed in carriages of any con- " struction whatever."

" I place my rails from twenty-four to five inches apart, or I " make but one single line of rails, and I cause the men, horses, " or other animals employed for drawing the carriages to walk " without and on one side of the said double or single line of " rails, or on both sides of them if more than one animal be " employed, by which new contrivance my rails are made to " occupy so small a space that they may be established on the " sides of any common road of usual breadth in such manner that " this road will lose very little of its width for the use of common " carriages.

" The rails are fixed upon and supported by a proper foundation " of stone or wood upon blocks, pillars, or posts, placed at proper " distances, but a good deal more elevated above the ground than " in the usual way, that is to say, from five to ten inches and " upwards, and the plates of the said rails are quite flat, having " no edge or rising projection on their upper surface, which is but " a little broader than the wheels of the carriages that are to run " upon them, by which means my rails are always kept clear of " sand, dirt, and rubbish.

" The plates of the rails are provided with a vertical or inclined " rest or support below, cast or joined in one piece with them, " which forms a lateral line of rails, the flat or plain surface of " the upper rails or plates projecting a little on each side of the " said lateral plates or supports.

" In particular cases where this elevated conveyance may be " impracticable, on account of the great weight of the loaded " carriages, or for any other reason, and where, of course, the " line of railway must be interrupted for a considerable length, " as, for instance, through towns, over long and narrow bridges, " I provide carts or waggons with platforms, upon which two or " more of my railway carriages can be placed as upon a move- " able bridge, and transported by as many horses as will be found

" necessary, upon the common road or pavement, to the point " where the continuation of the railway begins on the other side.

" For cross roads, upon which the traffic is not very consider- " able, the main railway can be carried on in one uninterrupted " line and level, and an occasional and temporary passage over " the same may easily be established by small swing bridges or " drawbridges, to be swung round or drawn up at the arrival of " a train of carriages upon the railway; or two pieces of the iron " rails may, at any such place, be made moveable upon pivots, to " be lifted up or turned aside in order to form a temporary " opening for the passage of carriages which come across. As the " carriages upon my railways, if properly constructed, move so " easily that with the least uniform declivity of the rails they will " run by themselves, I do, in certain cases and situations, lay " down my said railways with such a gentle and equal declivity " for the length of one hundred or more hundred yards, and at " the end of each such declivity, when the rails are arrived nearly " at the level of the ground, I do elevate the same at once to the " perpendicular height of three, four, or more feet, by means of " an inclined plane, from the summit of which the line of the " railway is continued, with the same gentle declivity, to a similar " distance.

" In some cases and situations I also make use of the power of " wind for the propelling of my light carriages upon the said " improved railroads, or to assist and accelerate the movement of " such carriages by means of a small sail put up occasionally."

[Printed, 4*d*. No Drawing. See Rolls Chapel Reports, 8th Report, p. 111. Rolls Chapel.]

A.D. 1816, September 30.—N° 4067.

LOSH, William, and STEPHENSON, George.—" Improve- " ments in the construction of railways and tramways."

" The invention relates to edge, round-top'd, fish-backed, plate " tramway, and barrow-way plate rails. In the construction of " our edge railways our objects are, to fix both the ends of the " rails, or separate pieces of which the ways are formed, unmove- " able in or upon the chairs or props by which they are supported, " and to place them in such a manner that the end of any one " rail shall not project above or fall below the corresponding end " of that with which it is in contact, or with which it is joined;

" also to form the joinings of the rails with the pedestals or props " which support them in such a manner that if these props should " vary from their perpendicular position in the line of the way " the joinings of the rails with each other would remain as before " such variation, and so that the rails shall bear upon the props " as firmly as before. The formation of the rails or plates, of " which a plate railway consists, being different from the rails of " which the edge railways are composed, we are obliged to adopt " a different manner of joining them, both with each other and " with the props and sleepers on which they rest; but in the " joining these rails or plates upon their chairs and sleepers we " fix them down unmoveable, and in such a manner that the end " of one rail or plate does not project above or fall below the end " of the adjoining plate, so as to present an obstacle or cause a " shock to the wheels of the carriages which pass over them; and " we also form the joinings of these rails or plates in such a " manner as to prevent the possibility of the nails which are " employed in fixing them in their chairs from starting out of " their places from the vibration of the plates, or from other " causes."

The patentees also describe improvements in the construction of railway wheels and locomotive engines.

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 30 (*second series*), p. 321; Register of Arts and Sciences, vol. 4, p. 446; Engineers' and Architects' Journal, vol. 10, p. 113; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 402; Webster's Reports, vol. 1, pp. 199 and 205. Petty Bag.]

A.D. 1817, August 5.—N° 4149.

HAWKS, JOHN.—" A new method of making iron rails to be " used in the construction of railways."

" Instead of making the rails or bars of cast or malleable iron, " as those now in use are, they are a compound of malleable and " cast iron so connected as to be stronger than if made of either " kind alone.

" The modes of combining cast and malleable iron together in " the rails are various, but that which I prefer as affording the " best security for their being firmly affixed together is by running " the cast iron, when in a state of fusion, on the malleable " iron, to effect which the malleable part must first be forged or " otherwise prepared in that form and of that strength which the

" nature of its intended purpose or appropriation points out as
" most proper. Such part of it as is intended should be immerged
" or adhered to the cast iron, should be rendered rough and
" uneven by jogging, or by perforation, or by giving it a dovetail
" form, or by any other means, so that the cast iron may affix
" and firmly adhere thereto without the liability of becoming
" loose by jerks of the wheel, or wheels occasioning vibration, &c.
" The malleable part must be clean, warm, or at least perfectly
" dry, when laid in the mould to receive the melted iron, which
" should be poured in as soon as possible after the mould is ready
" to receive it, as any damp on the malleable iron will endanger
" the soundness of the cast iron part."

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 32 (*second series*), p. 17; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 409; Rolls Chapel Reports, 7th Report, p. 118. Rolls Chapel.]

A.D. 1820, October 23.—N° 4503.

BIRKINSHAW, John.—" Certain improvements in the manufacturing and construction of a wrought or malleable iron railroad or way."

"The invention consists in the adaptation of wrought or malleable iron bars or rails of a peculiar form instead of cast-iron rails as heretofore. From the brittle nature of cast iron it has been found by experience necessary to make the bars of a railroad sufficiently strong to bear at least six times the weight intended to be carried along the road, by which the original cost of a railroad was considerably augmented, or if light rails were used the necessity of frequently repairing entailed a heavy expense upon the proprietors. To obviate these objections a bar is made of wrought or malleable iron, the original cost of which will be less than the ordinary cast-iron bars or rails, and at the same time will be found to require little reparation in the course of many years. The rails or bars are formed as prisms, though their sides need not of necessity be flat.

" Claims the exclusive right of manufactureing and vending the wedged-formed bars or rails of malleable iron of any length for the purpose of forming or constructing railways or railroads."

[Printed, 6*d*. Drawings. See Repertory of Arts, vol. 39 (*second series*), p. 206; London Journal (*Newton's*), vol. 2, p. 9; Engineers' and Mechanics' Encyclopædia, vol. 2, pp. 411 and 552. Rolls Chapel.]

A.D. 1821, September 14.—Nº 4591.

LOSH, William.—" Certain improvements in the construction " of iron rails for railroads."

"The improvements consist, first, in fixing bars of malleable " iron on the upper surface of a line of cast-iron rails or malleable " iron rails of whatever form; such rails may in the longitudinal " direction of the rails when laid, so as to form an uninterrupted " line the whole length of the bar, which may be as long as it " shall be found convenient and economical to use, and of the " same breadth as the upper surface of the rails to which it is fixed, " or a little broader or narrower.

" In some cases is fixed a band or strap of malleable iron to the " under surface of rails made of cast iron, in order that such band " or strap may by its power of tension give support to the cohesion " of the parts of the cast-iron rail, and admit of its being made " lighter, and thus save expense while it adds to security from " breakage.

" Claims as an improvement a rail formed by placeing two bars " of malleable iron on their sides or edges, and fixing them in that " position by bolts and studs, or by any other convenient method, " and on their upper edges placeing and fixing a flat bar of malleable " iron, or one which is slightly curved or rounded at the " edges, to diminish friction, so that the bar or plate placed and " fixed on the upper edges of the two malleable iron bars shall " form the surface upon which the wheels of the waggon or " carriage are to revolve."

" The upper surface of a railway may be placed, altho' not originally " intended to be so, by tapping holes in the surface of the " rails and fixing on the plates by means of screws introduced " thro' countersunk holes in the plates into the holes thus tapped " in the rails, and screwing them down, the head of the screw " filling the countersink, prevents its drawing through, and so " fixes the plate firmly and securely on the surface of the rail."

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 41 (*second series*), p. 197; London Journal (*Newton's*), vol. 3, p. 242; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 413. Rolls Chapel.]

A.D. 1821, November 22.—Nº 4618.

PALMER, Henry Robinson.—" An improvement or improvements " in the construction of railways or tramroads."

“The nature of the improvements consists in the substitution “ of a single line of rail instead of the double lines of rails commonly used, supported at such a height from the surface of the “ ground as to allow of the centre of gravity of the carriage or “ carriages to be used thereon being below the upper surface of “ such line of rail. The method of constructing such line of rail “ is to fix or set up a series or row of posts, piles, or pillars, at the “ distance of about nine feet from each other, in the course or line “ of the intended road, whose altitudes above the surface of the “ ground are such as to terminate at their upper extremities in or “ nearly in a plane parallel to the intended plane of the road.

“The posts or pillars may be made of any material of which “ such articles are usually composed, but the patentee recommends “ constructing them of cast iron.”

In order that the carriages may pass from one line of rail to another a portion of the rail is jointed forming a long switch bar or swing rail and is moved with a carriage upon it.

The patentee also described such swing rail with a carriage resting upon it centred and turning upon one of the supporting pillars, answering the purpose of a turntable. “In order to cross “ a public road, the rail being at such a height that carriages could “ not pass under it, I should form that part of the rail which is “ intended to cross the said public road in the manner of a turnpike-gate.”

[Printed, 1*s*. Drawings. See Repertory of Arts vol. 1 (*third series*), p. 129; London Journal (*Newton's*), vol. 5, p. 157; and vol. 10, p. 32; Mechanics' Magazine, vol. 27, p. 394; Register of Arts and Sciences, vol. 1, pp. 97 and 131; vol. 2, pp. 150 and 353; vol. 3, p. 141; vol. 4, p. 219; also vol. 1 (*new series*), p. 9; and vol. 4 (*new series*), p. 25; Engineers' and Mechanics' Encyclopædia, vol. 1, p. 615; also vol. 2, p. 425. Petty Bag.]

A.D. 1824, February 19.—N° 4905.

VALLANCE, John.—“A method of communication or means of “ intercourse by which persons may be conveyed, goods transported, or intelligence communicated from one place to another “ with greater expedition than by means of steam carriages, steam “ or other vessels, or carriages drawn by animals.”

The means proposed for carrying out this invention is a hollow tube or cylinder. This cylinder reaches from one to the other of the places between which communication or intercourse is to be made. The tube is composed of cylindrical pieces about twelve feet long, six feet diameter, and one inch and a quarter in thickness and bored out truly cylindrical. They are laid and embedded in masonry, and carried over rivers on bridges; at the joints to make them air tight they are hooped round, a quarter of an inch being left as room for expansion. A piece of cast iron is fixed along the bottom of the cylinder to form a groove, channel, or track for a wheel to run upon similar to those of a railway. A hollow cylinder or piston made of framework about twelve feet long is placed inside the tube with a wheel in the centre intended to run in the groove or channel inside the tube. This combination of apparatus by which persons may he conveyed or goods transported from one place to another by being placed inside the piston or travelling vehicle moved by forcing air in behind it or exhausting it from before it by an arrangement of valves and air pumps. The patentee also describes a plan of signal communication from a distance by the agency of water in a pipe, also means of registering and measuring impulses given to the column of water in the pipe.

[Printed, 1*s.* 6*d.* Drawings. See Repertory of Arts, vol. 1 (*third series*), p. 52; London Journal (*Newton's*), vol. 10, p. 113; and vol. 12, p. 151; Mechanics' Magazine, vol. 6, pp. 338 and 426; vol. 7, pp. 15, 36, 58, 167, 294, 251, 307, 367, 377, and 412; also vol. 8, pp. 11, 35, and 68; Register of Arts and Sciences, vol. 1, pp. 281 and 292; vol. 2, p. 325; also vol. 4, p. 327; Engineers' and Mechanics' Encyclopædia, vol. 1, p. 32. Rolls Chapel.]

A.D. 1824, February 28.—N° 4913.

JAMES, William.—" Certain improvements in the construction
" of rail and tramroads or ways, which rail or tramways or roads
" are applicable to other useful purposes."

"The invention consists in making the rails hollow, of any
" form that may be desired, in producing a rail with a double
" roadway, to be firmly fixed as the centre of two lines of railway,
" thereby saving one rail in four; also in affording the means of
" conducting water, gas, or other fluids from place to place through
" the hollow tube of the rail; and in employing the hollow rail
" as a trunk to receive ropes, chains, or rods passing from a
" standing engine or other machine, for the purpose of protecting
" them from external injury. In attaching to such rail
" or tramways certain rods, wheels, and endless chains, for the
" purpose of drawing carriages allong the said railway by means
" of standing engines."

[Printed, 6*d.* Drawings. See Repertory of Arts, vol. 1 (*third series*), p. 184; London Journal (*Newton's*), vol. 9, p. 191; Register of Arts and Sciences, vol. 2, p. 241. Rolls Chapel.]

A.D. 1825, March 5.—N° 5117.

JAMES, William Henry.—" Certain improvements on rail-" ways, and in the construction of carriages to be employed " thereon."

" This improvement on railways consists in forming the rails at " those parts of the road where curves or turns are to be made, " with ribs of different elevations, and adapting grooves of " different diameters on the peripheries of the carriage wheels to " run upon these rails, so as to cause the two opposite wheels on " the same axle of the carriage to vary in their circumferences at " those parts of the rail where the carriage has to turn, and " consequently to run in curves instead of straight lines."

[Printed, 8*d*. Drawings. See Repertory of Arts, vol. 2 (*third series*), p. 59; London Journal (*Newton's*), vol. 10, p. 301; Register of Arts and Sciences, vol. 4 (*new series*), pp. 126 and 137; Engineers' and Mechanics' Encyclopædia, vol. 2, pp. 457 and 465. Rolls Chapel.]

A.D. 1825, April 2.—N° 5145.

FISHER, Jacob Jeddere.—" A new application of railways, " and the machinery to be employed thereon."

" The principle of this invention is that of a railway of sus-" pension, which can be hung or supported from the upper part " of the same to any proper means of suspension, instead of being " supported from below.

" Claims any construction of railway and carriage to run upon " them which will admit of the bodies to be carried being sus-" pended immediately underneath the railway, while such railway " is supported from above, and its two side plates upon which the " carriage wheels run are not independent of each other, but are " fixed to the stock plate or frame from which the suspension " takes place, so that the said two side plates shall not be " independent of each other, and thereby liable to get out of " adjustment to each other."

[Printed, 6*d*. Drawings. See London Journal (*Newton's*), vol. 11, p. 98; Register of Arts and Sciences, vol. 3, p. 263; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 467. Rolls Chapel.]

A.D. 1825, April 12.—N° 5148.

BRANDLING, Robert William. — " Certain improvements " in the construction of railroads."

"To enable carts to travel both upon railroads and common " roads, and to leave the former, and return upon them at any " angle; this is done by means of elevators cast upon the rail, or " made separate, of iron, or any other hard substance, by single, " double, and triple tyred wheels and scrapers, with sockets, " joints, and springs, and by moveable shafts with liberating " joints."

[Printed, 6*d*. Drawings. See Repertory of Arts, vol. 2 (*third series*), p. 205; London Journal (*Newton's*), vol. 11, p. 367; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 468. Rolls Chapel.]

A.D. 1825, May 10.—N° 5160.

HILL, Thomas, the younger.—" Certain improvements in the " construction of railways and tramroads."

"The invention consists in substituting cast-iron pipes instead " of rails or bars for railways, and for a cheap and improved " method of laying railways with malleable iron bars; also for " diverting the main line of railways and tramroads at the passing " places or turn-outs.

"The pipes may be of various lengths, from three to twelve " feet, and from two to four feet diameter, and laid in iron, stone, " brick, or wood sleepers, hollowed out to form a socket one-half " the depth of the diameter of the pipe, and may be pinned down " or not, as they will fasten by use.

"A railway of malleable bars of iron is laid in an easy and " simple manner, and at a cheap rate, upon pedestals or sleepers " of iron, stone, brick, or wood, alternately, twelve and nine " inches square, at the distance of three feet, and six to twelve " inches or more deep, to be grooved for the reception of the bar " one inch deep on the back or outside, and half an inch on the " inside of the bars to be pinned down."

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 12, p. 365; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 468. Rolls Chapel.]

A.D. 1825, October 13.—N° 5267.

EASTON, Josiah.—" Certain improvements in the construction " of roads or ways."

"Improvements in the manner of constructing the roads or " ways for locomotive or steam carriages, or other carriages to

" travel over; consists in forming such roads or ways with blocks " or masses of stone suitably bedded upon a solid foundation, in " the manner of masonry, in order to form two parallel paths at " a proper distance asunder, and sufficiently firm to sustain the " wheels of the locomotive or steam carriages; and broad flat bars " of wrought iron are bedded upon the stonework, and fastened " down thereto in the proper tracts for the wheels to run upon, " but without forming any projecting sides or flanges, either on " the wheels or on the bars, which can occasion dirt or snow to " lodge and accumulate thereon, and cause obstruction to the " passage of the wheels. But to retain the wheels of the carriage " from quitting or deviating laterally from the said iron bars or " tracks, a range of blocks of stone is laid and fixed along the " centre of the road or way, so as to form an eminence in the " middle between the two tracks for the wheels of the carriages, " and small horizontal guide wheels or trucks are fitted into " blocks, which are so fixed beneath the bed of the carriage as " that the circumferences of the said horizontal guide wheels " shall apply laterally to the sides of the central range of stone " blocks at the upper parts, and on the opposite side thereof, " in such a manner as to prevent the carriage deviating side- " ways from the proper track, and therefore the wheels of the " carriage will be confined to travel regularly along the iron " bars."

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 11, p. 292; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 475. Petty Bag.]

A.D. 1828, May 1.—N° 5646.

BROWNILL, JONATHAN.—"An improved method of trans- " ferring vessels from a higher to a lower level, or from a lower to " a higher level, on canals, and also for the more conveniently " raising or lowering of weights, carriages, or goods on railroads, " and for other purposes."

" It consists in an improved apparatus for raising or lowering " goods from one level to another on canals or railways, by means " of which the weight to be raised is suspended over a double set " of pullies, and between two balance weights instead of one, as " heretofore, such balance weights being vessels containing water, " the quantity of which may be adjusted exactly to compensate "the weight to be raised in a new manner. Claims the arrangement of a caisson with a double bottom, connected with reservoirs, or of a platform suspended between two sets of pullies and two balance weights.

"Also the arrangement of reservoirs and connecting pipes for transferring water with very little waste backwards and forwards, as occasion may require, to work the said double-union safety lift on railroads, and in other situations."

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 8 (*third series*), p. 466; London Journal (*Newton's*), vol. 7 (*second series*), p. 78; Register of Arts and Sciences, vol. 3 (*new series*), p. 33. Rolls Chapel.]

A.D. 1828, September 18.—N° 5704.

LOSH, William.—"Certain improvements in the formation of iron rails for railroads, and of the chairs or pedestals in or upon which the rails may be placed or fixed."

"The patentee says he has two objects in view: First, to give aditional strength to such parts of the rails as in former modes of constructing them appear to suffer most from the pressure and shocks to which they are subjected by the passage of loaded waggons or other carriages. Secondly, to join the rails to the chairs which support them by such means as shall be less liable to be deranged by the carriages which shall pass over them than those modes which have hitherto been adopted. To accomplish these objects I form my malleable iron rails with certain projections upon their lower edges, and which projections may be formed by welding, hammering, rolling, or otherwise, at the joints of my improved cast-iron rails, which I propose to make with half-lap ends or joints.

"The patentee introduces, by casting them in proper moulds, studs, and cavities, or sockets on the sides of the half-laps, and which will add to their strength, at the same time that they will facilitate and make more perfect their junction with the chairs on which they are to rest. Lastly, he forms, by casting them in moulds made from proper models, chairs of such peculiar forms as shall be adapted to receive and support the rails of my particular construction."

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 9 (*second series*), p. 123. Rolls Chapel.]

A.D. 1829, May 10.—N° 5790.

DICK, Maxwell.—"An improved railroad, and method of "propelling carriages thereon by machinery, for the purpose of "conveying passengers, letters, intelligence, packets, or other "goods with great velocity.

"The invention consists in the erection of suspension lines of "railway, by means of which a velocity of communication by "wheel carriages may be gained hitherto unknown in the annals "of commerce, in the erection of which suspension railways there "will require to be built or erected numerous columns, pillars, or "other supports, to be of different heights and constructions, as "circumstances or the particular situation of the country may "require, so as to favour as much as possible a rising, falling, or "undulating surface, crossing of rivers, mooses, or other obstacles, "the whole intended to run from stage to stage in direct lines. "The rail of which I most approve, whereon the carriage is suspended and passes right under the rails, they being four in "number, of an oblong arrangement, the two upper being the "bearing, and the two under the safety rails. These rails are all "kept parallel with each other by means of braces or stays formed "of iron, to which the rails are securely fastened at every three "or four feet distant from each other. These braces or stays "may be varied in strength, pattern, or distance from each other "as may be thought necessary. The carriage is furnished with "deeply grooved wheels, which run upon the upper rails, and "with flat surface safety wheels on the under rails.

"The method proposed of dragging the carriage along the "railway is by means of fixed or stationary engines acting with "drag lines or rope, which, if the line of the rail be double, "would act in an endless round; but if a single line of railway, "then the engines shall be interchangeable and reciprocal, which "method of drawing carriages by means of rope or line is already "well known."

[Printed, 1*s*. 4*d*. Drawings. See London Journal (*Newton's*), vol. 9 (*second series*), p. 168; Mechanics' Magazine, vol. 13, p. 258; Register of Arts and Sciences, vol. 4 (*new series*), p. 161; and vol. 5, p. 47; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 503. Rolls Chapel.]

A.D. 1831, February 21.—N° 6079.

GRIME, Jeremiah, the younger.—"A certain method of dis"solving snow and ice on the trams or railways in order that

" locomotive steam engines and carriages, and other carriages, " may pass over railroads without any obstruction or impediment " from such snow or ice."

"In applying heat to tramways and railways, either through " pipes underneath or along side of solid rails or trams, through " pipes, rails, or trams themselves when hollow, or both of them, " in such a manner as to melt the snow or ice that would other- " wise collect upon the same, and impede the progress of carriages " thereon.

"The line of rails is divided into stations of a convenient dis- " tance, from about two or three miles apart, and at each station " is a boiler. In the boiler the water is heated and forced " through a pipe into the hollow rails to the next station, and " so on from station to station to any required distance; the " boilers and transverse pipes are all supposed to be placed in a " situation several inches below the level of the rails, which will " be found a convenience in regulating the flow of the hot water. " An arrangement of taps or valves by means of which the hot " water is received into and driven out of the boiler, and driven " into and received out of the hollow rails as occasion requires. " A float is connected by means of a rod and levers to the taps, " the water is expelled by the elastic force of the steam in the " boiler into the hollow trams or rails."

[Printed, 6*d*. Drawings. See Repertory of Arts, vol. 12 (*third series*), p. 209; London Journal (*Newton's*), vol. 6 (*conjoined series*), p. 285. Register of Arts and Sciences, vol. 6 (*new series*), p. 200; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 548. Rolls Chapel.]

A.D. 1831, October 31.—N° 6187.

MACDONALD, JAMES.—(*A communication.*)—" A certain im- " provement or improvements in the construction of bridges " made of iron or other materials, which improvement or im- " provements are also applicable to the construction of piers, rail- " roads, roofs, and other useful purposes."

[No Specification. Title printed.]

A.D. 1832, June 29.—N° 6281.

McDONALD, JAMES.—(*A communication.*)—" An improved con- " struction of railroads."

"This invention consists in a peculiar mode of arranging and " combining bars, rails, or ribs of metal, so that the several bars,

" rails, or ribs shall respectively sustain or support the pressure
" and tension of each other, and which combination applied to the
" construction of roads or ways for the passage of tram waggons
" and other carriages.

"This peculiar arrangement of bars, rails, or ribs constitute
" when combined in certain lengths, from forty to fifty feet, a
" succession of very flat curves or segments of polygons, which
" will not require the lateral support of abutments, as they bear
" perpendicularly upon their piers placed at proper distances.
" The leading feature of this invention may be perceived by re-
" ference to the rafter tie beam and king post of an ordinary roof,
" the structure of the improved road or way being a succession
" and construction of rafters, tie beams, and king posts connected
" by transverse bolts, by which is obtained strength and stability,
" suited to the construction of a railway erected upon columns,
" piers, or sleepers, at any height from the ground, by arranging
" and contriving diagonal, horizontal, and perpendicular bars,
" rails, and ribs of metal so as to produce nearly an equal tension
" and pressure of the parts."

[Printed, 1s. 6d. Drawings. See London Journal (*Newton's*), vol. 2 (*conjoined series*), p. 158. Rolls Chapel Reports, 7th Report, p. 139. Rolls Chapel.]

A.D. 1832, September 8.—N° 6306.

BADNALL, Richard, the younger.—"A certain improvement,
" in the construction or formation of the trams, rails, lines of rails,
" or tram roads upon which locomotive engines shall or may work
" or be employed."

The patentee says, "I claim as my invention the forming of
" trams, rails, lines of rails, or tram roads in such undulating
" curve or curves as will enable me in ascending hills to combine
" and apply the advantages of momentum from gravity acquired
" in running down the descending curves of hills with the pro-
" pelling power of locomotive engines to be employed thereon,
" not confining myself to any particular extent of line or form of
" curve, but varying and adapting the curve or curves according
" to the surface of the country, or other local circumstances."

[Printed, 6d. Drawings. See Repertory of Arts, vol. 15 (*third series*), p. 202. London Journal (*Newton's*), vol. 2 (*conjoined series*), p. 177. Engineers' and Mechanics' Encyclopædia, vol. 2, p. 551. Rolls Chapel.]

A.D. 1832, September 29.—N° 6317.

CONVERSE, Sherman.—(*A communication.*)—“Certain im“provements in making or manufacturing metallic rails for the “construction of railroads.”

“The improvements consists in the application of a rod, bar, “or bolt of wrought iron longitudinally under the common “wrought iron rail, of such length as to be attached to or firmly “connected with two successive chairs, so that the said rod may “firmly secure the two chairs with which it is connected from “separating in the direction of the tension of the said rod. In “the form of the chair, which is to be adapted to the use of the “tension rod and braces to be herein-after described.

“In the introduction of braces when the distances between the “chairs shall be so great as to require additional support to the “crown of the rail, the said braces to consist of wrought iron “brasor bolts, of suitable length and dimensions, and so applied “that one end of each shall set into or rest firmly against the “insides of the two chairs, and just above where the tension rod “is connected with the chair, while the other end of each is “elevated to the foot or under side of the rail, so as nearly to “meet in the middle between the two chairs, and is there secured “by being let into a solid piece of cast iron with grooves or “indentations to receive the ends of the braces, and which is “attached to the foot or under side of the rail. And also in “connecting or tying the two lines of rail in the road by means “of rods passing from rail to rail across the road, or from chair “to chair across, and attaching them to the rails or chairs “in any suitable manner so as to operate both as a tie and a “brace.”

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 15 (*third series*), p. 210; London Journal (*Newton's*), vol. 3 (*conjoined series*), p. 198; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 552. Rolls Chapel.]

A.D. 1832, November 6.—N° 6328.

SCRIVENOR, Harry.—“A certain improvement or improve“ments in the construction of iron railways.”

“The invention consists in constructing those parts of railways “usually called chairs or pedestals of wrought iron instead of “cast iron heretofore used for that purpose, either in one single “piece or more pieces, as may be thought best for the particular

" railroad on which they are intended to be used. Claims the " substitution of wrought or malleable iron in place of cast iron " in the construction of those parts of iron railways called chairs " or pedestals, whether the same be made in one single piece or of " separate pieces rivetted or otherwise fastened together, as " herein-before described."

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 15 (*third series*), p. 65; London Journal (*Newton's*), vol. 2 (*conjoined series*) p. 166; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 553. Rolls Chapel.]

A.D. 1833, June 1.—N° 6433.

JESSOP, William.—" Certain improvements in constructing " railways."

" The invention relates to the manner of constructing the chairs " in which the rails are fixed, that is, in place of the usual mode " of fixing and supporting the chair upon a stone block, wood " or other sleeper, the chair is made distinct from the pedestals, " which is attached to the stone block, wood or other sleeper, " and the chair and pedestal are connected by a universal joint or " hinge, which permits the pedestal to adapt itself to any irregular " sinking of the block or other support upon which it rests, and " insures a firm or solid bearing on its base; or this may be " effected by the combined motion of a hinge joint or other means " permitting motion between the pedestal and chair, and a move- " able joint formed at the junction of the chair and rail, so as to " produce the same effect, and thereby answer the purpose of a " universal joint."

[Printed, 8*d*. Drawings. See Repertory of Arts, vol. 16 (*third series*), p. 199; London Journal (*Newton's*), vol. 4 (*conjoined series*), p. 183; Mechanics' Magazine, vol. 19, p. 282; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 554. Rolls Chapel.]

A.D. 1833, June 20.—N° 6438.

GIBBS, Joseph, and APPLEGATH, Augustus.—" Certain " improvements in the construction of railroads, bridges, piers, " jetties, and acqueducts, part of which may be applied to other " useful purposes."

" A railway composed of wrought-iron rods supported upon " columns" fixed to " foundation plates made of cast iron, and " connected together by bolts and nuts, and secured to the earth " or soil by means of vertical rods, furnished with moveable

" arms or flukes, which when open prevent the return of the " bolts; the wrought-iron rail rods are intended to be laid down " in as long lengths as possible; simple bearing chairs must be " introduced at convenient distances; these chairs may be con" nected with the earth in the manner before described, if neces" sary. In the under or supporting rail, which may be made of " cast iron, the upper surface is slightly concave, to receive the " wrought-iron rail rod, and should be as long as possible, to " combine several supporting rails by one joint. The ends of the " rail are made wedge-shape and the chair also. The ends are " forced up against the sides of the chair, and firmly held there " by means of wedges; the chairs may be fastened to sleepers or " blocks, or they may be connected with the earth. The wheels " to be used with these rail rods may either be made with flat " holes and flanges in the usual manner, or their rims may be " concave, taking care that their concavity is part of a larger circle " than the railroads."

[Printed, 2*s.* 2*d.* Drawings. See London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 399. Rolls Chapel.]

A.D. 1833, August 10.—N° 6457.

SMITH, Robert, and WILKINSHAW, John.—"An improved " rail for railways."

" The invention consists in making or forming wrought or " malleable iron rails for railways with feet or pedestals formed in " one piece with the rail itself, and projecting at intervals from the " sides and base or bottom parts thereof, and which projecting " pedestals, or feet are intended to support the rails in their " proper position upon sleepers or blocks of stone or wood, and " are intended to be used in place of ordinary chairs or pedestals " of the common rail."

[Printed, 1*s.* Drawings. See London Journal (*Newton's*) vol. 4 (*conjoined series*), p. 115; Rolls Chapel Reports, 7th Report, p. 146. Rolls Chapel.]

A.D. 1833, December 11.—N° 6524.

STEPHENSON, Robert, the younger.—"An improvement in " the mode of supporting the iron rails for edge railways."

" The invention consists in supporting the iron rails upon " a segmental bearing piece, which is lodged in a suitable cell at " the bottom of the notch in each chair, the rail being confined

" downwards on such bearing piece by the same force of keying " action, which also confines the rail laterally in the chair, and " the action or pressure which produces such confinement being " applied at or very near to the centre of curvature of the " said segmental bearing piece, and of the cell wherein the same " is lodged, in order that the supporting and confinement of the " rails may not be disturbed or relaxed by a slight tilting or inclination of the chair in the direction of the length of rails, and " in the mode of producing the requisite confinement of the rails " in the chairs by means of wedge-like cross keys and cylindrical " pins, applied in suitable sockets through the cheeks or sides of " the chairs, and by forcing the pointed extremities of those pins " into oblong grooved recesses in the rails, so as to exert an " oblique bearing-down action on the rails by the same force of " keying which produces the lateral confinement of the rails."

[Printed, 1*s*. 4*d*. Drawings. See Repertory of Arts, vol. 2 (*new series*), p. 270; London Journal (*Newton's*), vol. 6 (*conjoined series*), p. 80; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 560; Rolls Chapel Reports, 7th Report, p. 148. Rolls Chapel.]

A.D. 1834, March 1.—N° 6570.

PINKUS, HENRY.—" An improved method of or apparatus for " communicating and transmitting or extending motive power, by " means whereof carriages or waggons may be propelled on railways or common roads, and vessels may be propelled on canals."

" The invention consists in the application of a well-known " principle in pneumatics to and in combination with a new apparatus, or new and improved combination of apparatus and " machinery, whereby motive power can be generated, and great " velocity may be acquired.

" The principle applied is, that the action obtained by means of " a partial vacuum, by rarefying or partially exhausting the atmosphere contained in an extended tunnel, tube, pipe, or conduit, " having a transmitting and accelerating piston impelled by the " ordinary weight or pressure and elasticity of the atmosphere.

" The action is effected by the operation of air pumps worked " at stations along and near to the line of road by fixed steam " engines or stationary engines of any other kind, which may be " made advantageously available as first movers. The method of " communicating motive power to cars, carriages, or other moveable bodies consists in transferring the action generated or pro-

"duced in the interior of a tunnel, tube, conduit, or pipe to its "exterior by connecting a vehicle or machine situated within "and to be impelled along the interior, or on the inner side of the "said tunnel, tube, pipe, or conduit by the piston aforesaid, "which vehicle or machine is denominated the dynamic traveller, "with a car situated exteriorly or on the outer side of the said "tunnel, tube, pipe, or conduit, which car is denominated the "governor."

[Printed, 1*s.* 8*d.* Drawings. See London Journal (*Newton's*), vol. 6 (*conjoined series*), pp. 158 and 256; Mechanics' Magazine, vol. 23, pp. 65, 121, 150, 164, and 237; Engineers' and Mechanics' Encyclopædia, vol. 1, p. 86; Artizan, vol. 4, p. 1; Jurist, vol. 12, p. 233; Rolls Chapel, 7th Report, p. 150. Extension applied for but not granted. Rolls Chapel.]

A.D. 1835, January 22.—N° 6750.

"The enrolled copy of the Specification and drawings of this "Patent (dated 22nd January 1835) having being stolen from the "Petty Bag Office, the following Specification and drawing of a "Patent obtained in Scotland for an invention bearing the same "title, dated 10th April 1835, have been supplied in place thereof "from the records of the Office of Chancery in Edinburgh."

DAY, John.—"An improvement or improvements in the con"struction of railways."

"These improvements consists in constructing the iron rails for "edge railways with a sufficient breadth of horizontal surface at "the under side of the rail, to be supported upon the earth or "ballasting throughout the whole length of the rail, the earth "or ballasting being made sufficiently solid beneath the rail to "bear the same, wherefore the iron rails according to the im"provements will be equally supported by the earth or ballasting "beneath every part of the length thereof, instead of being "supported at intervals, leaving hollow unsupported parts of the "rails between their several points of support, as in the manner "commonly practised."

[Printed, 1*s.* 4*d.* Drawings. See Mechanics' Magazine, vol. 66, p. 558; Petty Bag. Specification stolen. Abstract from English Patent and copy of Scotch Specification, printed.]

A.D. 1835, February 16.—N° 6766.

PRICE, Joseph.—"Certain improvements in railways, and in "the means of transporting carriages from one level to another."

[No Specification enrolled.]

A.D. 1835, May 5.—N° 6827.

REYNOLDS, John.—“Certain improvements in railways.”

In “giving to the rails, bars, or plates on which the wheels of “carriages run, or are intended to run, a similar and equal “support in every part of their length, so that they shall not be “susceptible of depression or deflection by an incumbent weight “at one part more than another part.

“By cast-iron bearers” “laid and joined end to end in and “upon the ground or roadway, and which are of such width and “strength as to be incapable of being in any part depressed into “the ground or roadway to any injurious degree by carriages “passing up or along them, they being so connected or fastened “to each other as that no one of them shall be capable of any “vertical or lateral movement independent of those next adjoining “it. The rails, bars, or plates over which the carriage wheels are “intended to run may be either cast on, and with the bearers “form part of them, or they may be separate pieces of wrought “or cast iron fixed end to end upon or into the bearers, so as to “rest thereon throughout their whole length, or at short intervals “of their length. And by bearers formed of blocks of natural “or artificial stone, joined end to end, and laid or bedded upon “and in the ground or roadway, and which are of such breadth “and depth as to be incapable of being depressed into the “ground or roadway to any injurious degree by carriages passing “up or along them, the said bearers or blocks being placed edgeways, “and so connected or fastened together as that no one “of them shall be capable of vertical or lateral movement independently “of those next adjoining it.”

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 5 (*new series*), p. 285; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 574. Rolls Chapel.]

A.D. 1835, August 17.—N° 6885.

PINKUS, Henry.—“Improvements in inland transit, which “improvements are applicable to and may be combined with an “improved method of, or combination of method and apparatus “for, communicating and transmitting or extending motive “power, by means whereof carriages or waggons may be propelled “on railways or roads, and vessels may be propelled on “canals.”

"It consists in a method or in methods of constructing the " pneumatic valve and the valvular cord, and in the manner of " useing the same, one of which methods the patentee designs to " substitute for and in lieu of the valve and cord described in " the Specification of his former Patent, that is to say, when " applied to the railway tunnel therein described, the other " methods being more particularly applicable to a mode of " generating power by rarefication in an extended pneumatic " tunnel, pipe, or main situated on the outside of and transferring " the said power along such tunnel or main, and thereby impelling " or propelling cars, carriages, or vessels along and near to the " line of said extended main; in an improved method of con" structing the travelling diaphragm or piston which is attached " to the dynamic traveller, and improvements in the latter, " whereby communication may be established between the vacuum " part of the tunnel and a pneumatic engine situated in the " governor; in the combination and application of a well-known " means of transferring power induced by a fixed first mover " to pneumatic machinery placed at certain distances along a line " of railway; in a combination, being a means of working a line " of railway, which is denominated a reciprocating method; in a " further means of opening and shutting the station valves; in " procuring and bringing into available action the adhesive " power of some, or any, or all of the wheels of a train of cars or " carriages on a railway, and thereby to facilitate the impelling of " a train on an ascending plane; in the application of an improved " and self-acting brake, whereby the speed of a train in motion " may be retarded; in an improved method of constructing the " railway, and fixing and supporting the rails; the whole of " which several parts when combined in all or in part form what " is denominated a pneumatic railway."

[Printed, 2*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 23, p. 65. Rolls Chapel.]

A.D. 1835, December 3.—N° 6940.

PARKIN, Thomas.—"Certain improvements in sleepers or " bearers applicable to railways."

"In constructing or moulding sleepers or bearers applicable to " railroads of clays and other materials, and by burning the " same produce hard blocks, to be used as substitutes for the " ordinary stone sleepers now in use.

"An improved construction of sleepers or bearers for rails from "wood.

"In preparing the surface of the earth for continuous sleepers, "whether of stone or other materials; and also in constructing "hollow sleepers or bearers, and filling them with concrete or "cement."

[Printed, 8*d.* Drawings. See Mechanics' Magazine, vol. 24, p. 234; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 575. Rolls Chapel.]

A.D. 1836, April 23.—N° 7069.

KOLLMAN, George Augustus.—"Improvements in railways "and in locomotive carriages." "The application of a T-rail in "between the rails on which the carriages run; the object of this "rail is to guide the carriages, and at the same time to prevent "the carriages being thrown off the rail. The main rail or "governing track is so constructed as to prevent the carriages "running or being thrown off the track." The patentee does not confine himself "to any particular mode of affixing such rail "or governing track, though he prefers that it should be a double "T-rail, that is, having a part for preventing the carriage being "thrown off the railway, and controlling the direction of move"ment of the carriage; also the application of the frame to "control the wheels of locomotive carriages running on railways, "in order to cause the wheels of such carriages to keep the "required track, the axles of such wheels being capable of move"ment on axes, such frame being caused to move correctly to "the rails on which the locomotive carriages are running by "guide wheels."

[Printed, 6*d.* Drawings. Repertory of Arts, vol. 7 (*new series*), p. 188; London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 368. Rolls Chapel.]

A.D. 1836, May 18.—N° 7100.

DEBAC, Pierre Barthelemy Guinibert.—"Improvements "in railways."

[No Specification enrolled.]

A.D. 1836, August 6.—N° 7163.

BINNS, Thomas.—"Improvements in railways, and in steam "engines used thereon, and for other purposes."

"It relates to the mode of constructing the rails and supports "thereof for the passage of carriages.

"In the application of screws to propelling carriages up inclined "planes, and for regulating the descent of carriages down inclined "planes; and also to the construction of rotatory steam engines, "particularly applicable to the propelling of carriages on railways, "also for other purposes.

"The rails are cast together with inverted supports, which "consist of hollow trunks or castings of iron, which, being filled "with concrete or other suitable material, offers a secure support, "and will be more capable of ensuring a level and uniform surface "of rail than any other means at present in use for the same "purpose.

"The inverted supports are combined together, and retained "parallel by means of iron ties, one to each joint of rails and "supports, and these ties are affixed to the supports by means of "screws, or other suitable means.

"In applying screws on inclined planes of railways, the locomotive "carriage coming up with a train is to be hooked or connected "with the truck or carriage, and the shaft put into gear with the "working power; and it should be remarked that suitable clutch "boxes should be employed for this purpose, by which the "working of the screws may be put into and out of motion "whenever required.

"When the truck or carriage has arrived partly up the inclined "plane, so much as to have drawn up the whole train on the "inclined plane, a second truck or carriage should be run on, in "order to push the train up the inclined plane, in order that the "first truck or carriage may, when it comes to the top of the "incline, and consequently no longer acted on by screws, may "with the train of carriages be forced forward, and arrive in "a proper position for the locomotive carriage again to draw its "train; the trucks or carriages are then to be detached."

[Printed, 2*s*. 6*d*. Drawings. See Repertory of Arts, vol. 8 (*new series*), p. 65. Rolls Chapel.]

A.D. 1836, October 4.—N° 7199.

WHITE, James.—"Certain improvements in railways."

"The invention is an improvement of the chairs for supporting "and retaining the rails; also in an improvement in the construc"tion of slate blocks and the mode of retaining them in a parallel "position by cross ties of iron in order to keep the rails correct;

" and, lastly, in an improvement to prevent the ends of the rails " parting where they meet beyond the space allowed for the " contraction of the rails."

A machine is described for sawing and drilling slate blocks for railways.

[Printed, 1*s.* 10*d.* Drawings. See Mechanics' Magazine, vol. 45, p. 180; Engineers' and Architects' Journal, vol. 1, p. 162. Rolls Chapel.]

A.D. 1836, October 13.—N° 7209.

RUTHVEN, John.—" Improvements in the formation of rail or " rods for making railways, and in the method of fixing or joining " them."

" The rails consist of two hollow tubes cast into a rail, having a " suitable surface at the upper part for the wheels of railway " carriages. The particular feature of novelty consists of the " formation of the lower part by so placing the core in the process " of casting that the inner circle or bore shall be excentric to the " outer edge, the metal at the lower surface being considerably " thicker than the other parts, and gradually decreasing till the " upper portion of the circle or circumference, where the shape or " form for the edge rail is to be constructed, or is to be raised on " a second tube, as shown. It will be evident that by arranging " the thickness of metal so as gradually to increase from the lower " to the upper surface very considerable strength may be obtained " with lightness of metal. The rails are supported in their chairs " which are formed to receive the rails, and are merely capable of " sliding on to the rails sufficient to receive the ends of two rails " within them, that the rails may butt against each other and " form a joint, the chairs being only used where the joints or " parts of the railway bars come together.

" The second part also consists in constructing hollow wrought- " iron rails with suitable surfaces for the carriage wheels to " run on."

[Printed, 6*d.* Drawings. See Repertory of Arts, vol. 7 (*new series*), p. 319. Rolls Chapel.]

A.D. 1836, November 8.—N° 7217.

SMITH, James Elnathan.—(*A communication.*)—" Certain " improvements in railways, and on locomotive carriages to work " on such railways."

[No Specification enrolled.]

A.D. 1836, December 3.—N° 7244.

BOOTH, Henry.—“ Certain improvements in the construction “ and arrangement of railway tunnels to be worked by locomotive “ engines.”

“ It consists in the formation of duplicate tunnels near and “ parallel to each other, but with different and opposite gradients, “ there being in each tunnel one line of railway instead of forming, “ as is usually done, one large tunnel with two lines of railway, “ both lines having the same inclinations or gradients; and the “ difference of gradients which is recommended for general practice “ is after the rate of twelve to fourteen feet per mile. Supposing “ the tunnelling to be effected be one mile in length, and which, “ on the ordinary construction hitherto adopted would consist of “ one tunnel with two lines, or way through it, and that on the “ ordinary plan the same would be formed on the level,” the patentee “ recommends the construction of two tunnels having “ each one line of railway descending twelve or fourteen feet in “ the direction of the moving traffic, which arrangement may be “ accomplished by raising one end of each duplicate tunnel and “ depressing the other six or seven feet from the level line, each “ tunnel declining twelve or fourteen feet in the direction of the “ moving traffic through the said tunnel.”

[Printed, 4*d.* No Drawings. See Repertory of Arts, vol. 8 (*new series*), p. 243; Engineers' and Architects' Journal, vol. 1, p. 27. Rolls Chapel.]

A.D. 1836, December 9.—N° 7252.

YATES, John.—“ Certain improvements in the tram roads or “ railways, and in the wheels or other parts of carriages to be “ worked thereon.”

“ This invention consists in applying to railroads already con- “ structed, or to those which may be constructed in future, a tram “ or trams, wheelway or wheelways, inside or outside of each “ single line of edge rail, more especially where there is an incli- “ nation on the railway, such tram being made either of wood, “ iron, stone, concrete, or other suitable material or surface, in “ such manner that when the engine arrives at the part so con- “ structed the wheels, instead of working only on the edge rail, “ shall bear upon the tram, and thus obtain for themselves a

" greater adhesion or attachment by means of the larger bearing " surface."

Claims, "the combination of the edge rail and other surfaces " whereon an improved wheel may work."

[Printed, 10*d.* Drawings. See Rolls Chapel Reports, 7th Report, p. 178. Rolls Chapel.]

A.D. 1837, May 13.—N° 7373.

BAC, Pierre Barthelemy Gunibent de.—" Improvements " applicable to railroads." The patentee recommends, " when the " ground is soft and doubtful, that in order to prevent the blocks " being forced into the earth by the pressure of the loads passing " over the rails, that such spaces should be filled in with wood- " work, by which a more extended surface of bearing will be " obtained, and form, in fact, a complete bearing surface, by " which the blocks will be assisted in bearing the loads carried " over them, and they will consequently be less liable to be " deranged. The blocks are connected together at their angles " by means of what are called vertical ties, and which are formed " of cast iron, and they are so formed that the stones rest on and " are supported by the ties, and the upper surface of the stone " comes under a portion of the vertical ties, hence each tie may " be said to form a key to the angles of two stone blocks; and " when further combined by means of transverse ties of iron, the " whole length of railroad will be supported by a continuous " frame the parts of which mutually assist each other, and any " pressure or shock to one part is communicated to the sur- " rounding parts and borne mutually by them."

[Printed, 1*s.* 10*d.* Drawings. See Repertory of Arts, vol. 9 (*new series*), p. 327. Rolls Chapel.]

A.D. 1837, May 25.—N° 7380.

FREEMAN, Charles Joseph.—" An improvement or improve- " ments in machinery or apparatus called rolls for rolling iron or " other metals, applicable to rails for roads and bars of various " shapes for other purposes."

" The object of this invention is the construction of rolls in " such manner that the parts or working surfaces thereof may " with facility be so relatively set up to each other as they become " worn so that they may be continually brought up to produce

" bars or surfaces in continued succession more equal the one to " the other, and more correctly to guage than when produced by " means of rolls of the ordinary structure, which latter, as they " become worn, produce, as above mentioned, bars of increasing " dimensions."

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 9 (*new series*), p. 90. Rolls Chapel.]

A.D. 1837, November 25.—N° 7487.

VAILE, HENRY PURSER.—" Improvements in rails for rail- " roads."

" The object of the invention is to produce a more quick repeti- " tion of the sidings of sideway lounges of the carriages, thereby " shortening them and reducing their force or momentum by so " constructing the surfaces of the rails as to enable me to reverse " the diameters at any desired rate, causing the acting and re- " acting upon the weight to take place so quickly that it has not " time to remove in opposite directions, and thus give the carriage " a greater tendency to move in a more central position in repect " to the rails than heretofore without bringing the flanches of the " wheels so nearly in contact with the sides of the rails, and thus " to avoid the friction and strain consequent thereon to the " engine; and in giving to the rails such a shape or figure on " the upper surfaces that in place of the bearing surfaces for the " wheels on each rail being one continued and straight line con- " stantly parallel to the sides of the rail itself the surface 'is made' " to pass and return in an angular direction across the face or " upper surface of the rail, by which means the diameter of the " point of bearing of the wheel will be constantly varying by the " figure of the rail, hence those long sidings or sideway loungings " of the carriages will be interrupted by the figure of the rails " working or bearing surface, and the carriage will have a greater " tendency to retain and pursue a more central direction or course " in respect to the two rails which constitute the railroad."

[Printed, 6*d*. Drawings. Rolls Chapel.]

A.D. 1838, January 4.—N° 7528.

WORDSELL, NATHANIEL.—" Improvements in apparatus to " facilitate the conveyance of mail bags and other parcels on " railways or roads."

"The invention consists in applying mechanical means to rail-
" ways or railroads and the carriages which run thereon, whereby
" mail bags may be taken and left at any determined places or
" stations with the greatest facility without stopping or retarding
" the motion or speed of the train of carriages, and by such
" means the number of places for taking and leaving mail bags
" may be increased very materially and the general system of
" conveyance of mail bags facilitated; it is meant also to apply to
" bags containing parcels, for it is better to put small parcels in
" bags."

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 10 (*new series*), p. 257. Rolls Chapel.]

A.D. 1838, February 8.—N° 7563.

DEVILLE, JEROME.—" Certain improvements in railroads and
" in the carriages to be used thereon."

[No Specification enrolled.]

A.D. 1838, March 10.—N° 7590.

EVANS, THOMAS.—" An improved rail for railway purposes,
" together with the mode of manufacturing and fastening down
" the same."

" It consists in a rail with a dovetail or other catch grove in its
" under side, whereby it may be held firmly down; also in rolling
" the said rails in a series of peculiarly-shaped grooves in rollers
" to form the said dovetail or catch groove by rolling; and in
" certain plugs for fastening down the rails, which fit into and
" may be slid along the said groove and keyed down to chairs
" placed at any distance from each other along the line of the
" rail."

[Printed, 1*s*. Drawings. Rolls Chapel.]

A.D. 1838, June 2.—N° 7666.

HARDY, JAMES.—" Certain improvements in rolling making,
" or manufacturing shafts of metal, and in the machinery or apparatus used in the same."

" It consists in adapting the principles set forth in the Specifi-
" cation of a former Patent, granted April 4, 1835, for manufac-
" turing axle-trees for carriages and other cylindrical or conical

" shafts, and applying the same princples to the manufacturing of " certain articles, as square or polygonal shafts for machinery rails " for trams or railways, and the tire irons for wheels, and various " other articles, by a certain process of rolling bars of iron to " certain figures, and after faggotting such rolled bars together " bringing them into the required form by rolling, or by swages " attached to a tilt hammer or metal helve; and to introduce, as " portions of the said mass of metal, longitudinal bars of steel in " such situations as may be required for particular purposes, " and roll or weld these steel bars into combination with the " iron."

[Printed, 8*d.* Drawings. See London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 187; Practical Mechanics' Journal, vol. 2, p. 201. Rolls Chapel.]

A.D. 1838, June 18.—N° 7692.

WHITE, John.—" Certain improvements in the construction of " railroads, bridges, and viaducts."

" The invention as applied to railways being what is called a " resistance pile with blocks or chairs, with wedges for giving " tenseness to the bars which form the rails fixed upon it, a block " of iron is sunk into the top of the pile, and there spiked down. " Throug this block are cut horizontal mortices to receive the " lateral wedges or keys, while corresponding mortices are cut in " the rails, to allow the wedges to pass through.

" These resistance piles may be at any convenient distance from " each other, say about one sixteenth of a mile, and between them " at intervals of about fifteen feet, common piles should be driven " to receive similar blocks of a smaller size, and fastened down by " spikes passing through holes sufficiently larger than the spikes " to admit of the play consequent on expansion and contraction."

[Printed, 10*d.* Drawings. See Engineers' and Architects' Journal, vol. 1, p. 374. Rolls Chapel.]

A.D. 1838, July 11.—N° 7730.

WART, Henry Van, and GODDARD, Samuel Aspinall.— Certain improvements in machinery or apparatus applicable to locomotion on railroads and to steam navigation, parts of which improvements are also applicable to land or stationary engines.

" It consists in a novel or improved day or night signal to be " used on railways or locomotive engines, for the purpose of indi- " cating to the conducting engineer the position of the shunt or " shifting parts of the rails, or the direction in which the engines " are travelling, or whether moving or stationary, which improve- " ment is also applicable to fence gates or turn plates, or other " movable obstructions on railroads."

[Printed, 1*s.* 8*d.* Drawings. Rolls Chapel.]

A.D. 1838, August 10.—N° 7766.

BEURET, Eugene, Viscount de. — (*A communication.*) — " Certain improvements in the construction of railways and " tramroads to facilitate the ascent and descent of hills and " inclined planes."

The invention consists in providing for " the locomotive engine " separate rails of a substance of such a nature and so disposed " as to cause the working wheels of the engine to have a firmer " grasp than they can have upon the iron surface on which the " train runs.

" The peculiar rails proposed for the engines, and which may " be used either on inclined planes only or throughout the whole " line of road, as circumstances require, vary according to the " weight of the train, its velocity, the local materials for con- " struction, and the expence to be incurred.

" They may be made of granite, stone, bituminous cement, or " of a layer of hard materials such as are usually employed in " making roads, or of blocks of wood well pitched, placed either " lengthwise or in an upright position, and faced with small " pebbles or metallic plates less hard than iron; and the materials " last spoken of may be introduced in the groove of rails made " for the purpose either of cast iron or other suitable substance, " and they need not be above a few inches broad, and may be " laid down outside of the two iron rails" that the carriages run upon.

Instead of using the break in coming down inclines " in order " that the velocity may be gradually overcome and that the " action, at first easy, may go on increasing, it will be advisable " to give a slight curve to the internal surface of the two shafts " laid down in the middle of the road, so that the friction may

" first take place between two surfaces nearly parallel. The rubber " placed under the carriages, in penetrating in the opening " formed by the upper parts of the shafts, will cause them to " rotate on their axis, and in separating their lower extremities " will press on springs with the arm of a lever, hence the suppression of all excess of velocity.

" The carriage having passed, the springs will cause the shafts " to resume their former position, so as to afford a like resistance " to the succeeding vehicles."

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 12 (*new series*), p. 193. Rolls Chapel.]

A.D. 1838, August 15.—N° 7773.

FOX, Charles.—" An improved arangement of rails for the " purpose of causing a railroad engine, carriage, or train to pass " from one line of rails to another."

" The invention consists in such an arrangement of rails, where " it is required to have crossings or turnouts on to sidings, as " will prevent the wheels of the carriages, engines, or machines, " or trains used thereon, from getting off the lines they are " intended to run upon, and whereby the whole of the main line " may always remain a fixed line."

The patentee says the arrangement is equally " applicable to " all cases where it is required to make provision for engines, " carriages, or trains to pass from one line of rails to another, " whether on to sidings or otherwise, and claims the arrangement " of rails, particularly the guide rail and embedded turn-out rail, " whereby the fixed point 'is protected,' and the point of the " turn-out bar, as well as the shoulder of the recess made to " receive the same to prevent accidents."

[Printed, 8*d*. Drawings. Rolls Chapel.]

A.D. 1838, August 31.—N° 7792.

CURTIS, William Joseph.—" Certain improved machinery " and apparatus for facilitating travelling and transport on rail" ways, parts of which are also applicable to other purposes."

The patentee has made fourteen different claims, the three first only relate to switches, " which may be formed in various ways,

" whether by bolting two of the ordinary railway bars together at
" suitable distances from each other and curving one or more of
" the bars to suit the radius of the fixed line with which it agrees,
" or by the following method, which is considered superior to
" any other, viz., rivetting the bars, whether two or more, to a
" flat plate.

" The size of plate is half inch thick, ten or twelve inches wide,
" and fifteen feet long; the bars haveing a section to correspond
" with the rails are rivetted to this plate, one being bent to correspond
" with the curve or cross line, and the other straight to
" correspond with the main line (if straight); or, should both lines
" be curved, then both bars are curved to correspond with their
" respective lines.

" The bed planks are formed of oak three inches thick, and at
" regular distances stud plates are let into the bed planks, rising
" about one-eighth of an inch above the surface, so that the iron
" plates ride upon the iron surface of the stud plates with less
" fraction than if they were level with the timber.

" Towards each extremity of the stud plates studs are raised,
" which confine the switches within their limits of motion and
" form supports against which they rest, and thus acquire a
" certain degree of solidity whilst the trains pass over them.

" The oak planks are then let into the longitudinal timbers of
" the railway, if formed upon that plan, or bolted to timber of
" sufficient solidity, and united in the usual way with the rails, if
" the system of stone blocks and iron chairs be employed. A
" plate forms the centre plate for the centre studs to work in, a
" hole is bored in it to suit the pin, and it is then bolted to the
" bed planks, and thus the switches are secured at that end.
" Two radius bars connect the switches in the usual manner;
" the longer rod passes to a lever by which the movement of the
" switches is effected and acts in the manner of a treadle. Claims
" the employment of the safety guide rail and double switch for
" a single crossing, the change of rails being effected by the frame
" and transverse movement, also gearing or apparatus for working
" the switches."

[Printed, 3s. 8d. Drawings. See Mechanics' Magazine, vol. 31, p. 97; also vol. 32, pp. 369, 372, 409, 468, and 525; Engineers' and Architects' Journal, vol. 2, pp. 122, 239, 435, and 447; vol. 3, p. 5; vol. 6, p. 19. Rolls Chapel.]

A.D. 1838, September 13.—Nº 7809.

WILKINSON, Thomas.—" Certain improvements in the con-
" struction of tram or railways, and in the carriages to be used
" thereon."

" The invention consists in a peculiar construction in the form
" of the rails, and embedding them so as to present a more equal
" and uniform resistance, and whereby stone and wood may be
" employed as rails as well as iron. The rails, if of iron, are to be
" composed in preference of bars of wrought iron; the upper
" parts present a plane surface slightly inclining towards the outer
" side of the road, furnished with an inner edge raised laterally.
" Their lower surface has two projecting strengthening ribs, which
" correspond with the usual lines of the pressure of the wheels, the
" tyres or bands of which are to be slightly hollow in the centre.

" The rails rest for their entire length on longitudinal pieces of
" wood, which may be called sleepers. The pieces of wood are
" sunk in the trenches, and are there supported. The bottom of
" the trenches should be previously strongly compressed and con-
" solidated, and after the pieces of wood or sleepers, with the
" bearers or soles upon which they rest, are placed in the trenches,
" all the spaces which exist on each side are to be filled up with a
" thin cement, which will become hard and incompressible when
" solid, and of that well known description which will harden
" under the action of water composed of quicklime, sand, and
" small fragments of stone. In addition, stone should be driven
" into this cement by rammers, the more effectually and firmly to fill
" up the spaces, the foundation will possess a slight elasticity, which
" is necessary to produce a gentle motion, and will conduce to the
" preservation of the locomotive machines and of the carriages,
" and also of the road itself."

[Printed, 3*s*. 6*d*. Drawings. Rolls Chapel.]

A.D. 1838, November 3.—Nº 7852.

DEVILLE, Jerome.—" Improvements in carriages only."

[Printed, 10*d*. Drawings. Rolls Chapel.]

A.D. 1838, December 17.—Nº 7911.

HAWKSHAW, John.—" Certain improvements in mechanism
" or apparatus applicable to railways, and also to carriages to be
" used thereon."

"Also, in the application of an extra plate to the moveable "rails, which have hitherto been objectionable, in order to render "their use perfectly safe, as this plate, being furnished with an "inclined plane, and being also used with the improved shunt "protector, enables double rails to be employed in some cases "with more convenience than switcher or shunts, and is thus of "considerable advantage."

[Printed, 10*d.* Drawings. See London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 74. Rolls Chapel.]

A.D. 1839, January 3.—N° 7920.

CLEGG, Samuel.—"New improvements in valves, and the "combination of them with machinery."

"It consists in a method of constructing and working valves in "combination with machinery. These valves are similar to those "commonly used in air pumps. The extremity or edge of these "valves is caused to fall into a trough containing a composition "of bees'-wax and tallow, or any substance or composition of "substances which is solid at the temperature of the atmosphere, "and becomes fluid when heated to a few degrees above it.

"After the valve is closed and its extremity is lying in the "trough, the tallow is heated sufficiently to seal up or cement "together the fracture round the edge or edges of the valve "which the previous opening of it had caused; and then the heat "being removed the tallow again becomes hard; and forms an "air-tight joint or cement between the extremity of the valve and "the trough.

"When it is requisite to open the valve, it is done by lifting it "out of the tallow, with or without the application of heat; and "the process of sealing it is repeated every time it is closed; this "combination of valves with machinery is made in the application "of these valves to railways or other purposes, by a line of partially exhausted pipes, for the purpose of obtaining a direct "tractive force to move weights either on the railway or otherwise.

"This is effected by laying down a continuous length of pipe, "containing a lateral slit or opening its whole length. A piston "is made to travel in this pipe by exhausting or drawing out the "air from the pipe on one side of the piston, and allowing free "access to the atmosphere on the other side of it; an arm from

" this piston passes through the lateral opening to attach to the " carriages on the railway, and draws them along with it. The " whole of this lateral opening is covered by the valve before " described, and that part of it through which the arm passes is " lifted to allow it to pass, and also for the admission of air to the " piston, by means of an apparatus connected to the arm.

" The carriage to which this arm is attached is called the driving carriage; to the hinder part of this carriage a long heater is " attached, which is drawn along by it upon the tallow contained " in the trough, and reseals the valve ready for the next train, " which repeats the operations above described at certain distances. Steam engines and air pumps or other apparatus are " fixed for exhausting the pipe."

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 8 (*enlarged series*), p. 341; Mechanics' Magazine, vol. 33, p. 86; also vol. 37, p. 60; Engineers' and Architects' Journal, vol. 2, p. 253, 259, and 407. Rolls Chapel.]

A.D. 1839, February 23.—N° 7981.

PRATT, THOMAS.—" An improved capstan and winch for drawing and working on railways with drawing pulleys with flat or " round ropes."

" It consists in the application of a winch apparatus to the " working of ropes on railways, and in employing grooved wheels " driven by suitable cog wheels receiving motion from a steam " engine or other power."

[Printed, 1*s*. Drawings. See Inventors' Advocate, vol. 1, p. 67. Rolls Chapel.]

A.D. 1839, March 27.—N° 8017.

NEWTON, WILLIAM.—(*A communication.*)—" Certain improved " machinery for cutting and removing earth; which machinery is " applicable to the digging of canals and the levelling of ground " for railroads or ordinary roads, and similar earthworks."

" The patentee claims the form and arrangement of rotary " cutters, mounted in a carriage, which are made to break the " ground as the carriage advances, and also to conduct or throw " the earth thus loosened into a series of travelling buckets or " shelves, which carry it up out of the excavation, and deliver " it into a series of troughs moving in a transverse direction,

“ for the purpose of carrying off and discharging the loose earth
“ raised into carts or into any convenient situation by the side of
“ the excavation.”

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 350; Inventors' Advocate, vol. 1, p. 131. Rolls Chapel.]

A.D. 1839, April 9.—N° 8026.

PARKIN, THOMAS. — “ Improvements in railroad and other
“ carriages, in wheels for such carriages, and in roads and ways on
“ which they are to travel.”

The first “ improvement on railroads consists in forming the
“ rails of hard wood placed with the end of the grain in a vertical
“ or nearly vertical position, laid either in a bed of concrete, or of
“ cement, or of gravel.” The second, “ in the laying down of
“ tram rails and edge rails in the same continuous line along the
“ common road, the tram rails being generally laid at the crossings
“ of streets or roads, and in front of buildings, and the edge rails
“ at other parts of the road, in combination with certain com-
“ municating inclined pieces for the wheels to pass smoothly from
“ one kind of rail to the other, and in combination also with a
“ mode of securing both sorts of rails down upon bearers of
“ wood, by nails driven through the iron and through the wood
“ into continuous bearers of asphalte, or other suitable cement laid
“ in trenches dug in the road, the points of the nails being made
“ thicker or broader than the shanks, and driven in while the
“ cement is soft, so that the cement may collapse around the
“ neck of the nail, and prevent its being drawn out.”

[Printed, 1*s*. 6*d*. Drawings. See Repertory of Arts, vol. 13 (*new series*), p. 157; London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 256; Mechanics' Magazine, vol. 31, p. 146; also vol. 32, pp. 162, 258, 353, and 418; and vol. 49, p. 20; Patent Journal, vol. 5, p. 139; Webster's Patent Law, p. 140, case 158; Inventors' Advocate, vol. 1, p. 147; Carpmael's Reports on Patent Cases, vol. 2, p. 677; Law Journal, (*Exchequer*), vol. 23, p. 217. Rolls Chapel (*with Disclaimer*).]

A.D. 1839, May 22.—N° 8073.

HARPER, THOMAS. — Certain improvements in railways or tramroads :—

“ Consisting in a new method of forming and fixing the chairs
“ on which the rail is placed of separate pieces or cheeks of cast
“ iron; between such pieces or cheeks is introduced a wedge or

" block of wood, or metal, which is made to fit tightly, and " thereby to secure the cheeks in a firm position in the mortice to " receive the rail, which is bearing on the wedge and between the " cheeks in the usual way."

[Printed, 6*d.* Drawings. See Inventors' Advocate, vol. 1, p. 243; Engineers' and Architects' Journal, vol. 4, p. 88. Rolls Chapel.]

A.D. 1839, August 17.—N° 8200.

KOLLMAN, AUGUSTUS GEORGE.—" Improvements in railways, " and in locomotive and other carriages."

" It consists in applying wooden rails of a series of blocks side " by side, with their grain upwards, somewhat higher than the " iron rails on which the wheels of the locomotive carriages run.

" These additional rails are side by side with the iron rails, " and are fixed in such places as there are inclined plane to be " ascended; and the driving wheels of the locomotive carriage are " of two diameters, the larger diameter running on the iron rails " of the railway, and the smaller diameter when the carriage " comes to an inclined plane running on the extra wooden rails, " and for the time being carrying the locomotive carriage, for " which purpose it is roughened, so as to hold more effectually."

[Printed, 10*d.* Drawings. See London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 370; Inventors' Advocate, vol. 2, p. 179; Engineers' and Architects' Journal, vol. 8, p. 72. Rolls Chapel.]

A.D. 1839, September 16.—N° 8219.

DODDS, ISACE, and OWEN, WILLIAM.—" Certain improve- " ments applicable to railways."

" Consisting in novel constructions and modes of working the " switches on lines of railways, which are designed to prevent the " carriages getting off the line in the event of the switches being " improperly placed, and to secure the more perfect guidance of " the trains from one line of rails to another. A rocking cradle " is mounted upon pivots, and vibrates on stationary bearings; " it is necessary that the cradle should lie in the inclined position, " which is effected by a weighted bell-crank lever connected by a " slider, upon which are fixed two inclined planes working against " the surfaces of two other inclined planes fixed to the under " parts of the cradle.

" The weight on the lever being allowed to fall, the inclined

" planes are forced towards the left hand, and the cradle is " thereby tilted, so as to raise its right-hand side, so that the " higher side of the cradle will form with the right-hand rail a " groove, which guides " the train on to the required line; but if it is to shunt to the left, "the weighted lever must be raised by " hand, which will draw the inclined planes to the right, and " raise the left-hand side of the cradle, by which the carriage will " be conducted towards the left hand."

[Printed, 3s. Drawings. See Inventors' Advocate, vol. 2, p. 227. Rolls Chapel.]

A.D. 1839, November 21.—N° 8276.

FARAM, John.—"Certain improvements in the mode of con" structing switches for connecting different lines of railway, or " distinct railways, and for passing locomotive, steam, and other " engines, and railway carriages and waggons, from the one to " the other of such railways or rail, and for certain apparatus " connected therewith."

"The invention is so to arrange the apparatus of the switches, " together with apparatus in connection with the train of carriages, " that a person conveyed by the train when passing from a single " line of rails to either of two lines of rails, may have the power " of moving the switches into a proper position for the train to " take the proper direction, and thus render it unnecessary to " have persons attending to place the switchers correctly for the " next coming train." In constructing apparatus according to the invention, the patentee says, " it will be desirable so to arrange " the parts that the carriage coming in contact with the apparatus " in connection with the switches that the blow should be as " progressive as possible, and not suddenly, and that the apparatus " in connection with the train should travel as long a distance as " possible after touching the apparatus in connection with the " switches, in order to effect a transposition of the moveable parts " of the bars to produce a connection between the proper lines of " rails, for it is important to avoid shocks.

"The arrangement of switches, with apparatus arranged ac" cording to the invention is, that the moving parts form parts of " the rails on which the carriage run, and consists in an angle " line or pair of rails, which is capable of being put in connection " with either of the two pairs of rails, and this is brought about

" by the turning over of the bars or rails, each moving on cranked " axes, consequently allowing the bars or rails to make a direct " connection from the line of rails with either of the lines; by " this arrangement, when the flanch of a wheel comes in contact " with either of the bent bars, the switch bars will be turned over, " and ensure the carriage or train of carriages passing " from one line to another.

" The patentee claims the mode of constructing switches of " railways, and apparatus connected therewith, in such manner " as to be acted on by the travelling of a carriage, also the mode " of applying the rails moving on axes, and parts connected " therewith, whether combined or not with apparatus to be " worked by an axis when a train or a carriage is passing from a " single line of rail on to one of two lines of rails."

[Printed, 1*s.* 6*d.* Drawings. See Inventors' Advocate, vol. 2, p. 339. Rolls Chapel.]

A.D. 1840, March 3.—N° 8410.

RANGELEY, John.—Improvements in the construction of railways, and in the means of applying power to propelling carriages and machinery.

" It relates to a mode of constructing railways in such a manner " that the power employed for propelling carriages thereon is " caused to be transmitted by a series or train of wheels moving " on axles supported on stationary bearings fixed in the line of " railway, and in such a manner that the carriages for passengers " and goods are caused to pass over and be acted on and moved " by the rotatory motion of such wheels by the contact and " friction of their peripheries acting against the under sides of a " pair of running rails attached to each carriage."

[Printed, 1*s.* Drawings. See Engineers' and Architects' Journal, vol. 3, pp. 322 and 372; Inventors' Advocate, vol. 3, p. 163. Rolls Chapel.]

A.D. 1840, August 7.—N° 8595.

SMITH, Andrew.—Certain improvements in carriage wheels, rails, and chairs for railways.

" A longitudinal sleeper of wood of the ordinary size is embedded " in the ground upon which the rails rest. The rails themselves " are made of the common square bar iron, or of square bar iron " formed and manufactured of the size required.

"The sides of the square of the rail are about one-third more in "width than the depth of the sides in the groove in the wheel "tyre, which prevents the wheel from coming in contact with the "chair and sleeper. This bar of iron is laid in a groove cut in "the sleeper, and when so laid it presents one of the angles of "the square upwards, and corresponds with the groove in the "tyre of the wheel, and upon which the wheel runs. The chair "for connecting and supporting the rails is made of wrought or "cast iron, it clips the four sides of the bar in a dovetail manner, "and the chair itself is let into and bolted to the wood sleepers; "one of these chairs is placed at the junction for connecting the "separate and continuing rails, which are made about twelve "feet long by two inches and a quarter square, and when of that "length one chair in the middle of the bar, and those placed at "the junction of every two bars, are sufficient to attach and keep "the rail to the wooden sleeper. Claims the adaptation of "common square bar iron let into a wooden sleeper to be used "as rails for rails, and the chair for connecting, fixing, and "fastening the rails on railways."

[Printed, 6*d*. Drawings. See Mechanics' Magazine, vol. 34, p. 189; Inventors' Advocate, vol. 4, p. 100; Engineers' and Architects' Journal, vol. 4, p. 124. Rolls Chapel.]

A.D. 1840, September 22.—N° 8638.

PAIN, THOMAS.—"A plan by means of which carriages may be "propelled by atmospheric pressure only without the assistance "of any other power, being an improvement upon the atmospheric railway now in use."

[No Specification enrolled.]

A.D. 1840, September 24.—N° 8644.

PINKUS, HENRY.—"Improvements in the methods of applying "motive power to impelling carriages on railways, and in the "methods of constructing the roads or ways on which the "carriages may be impelled or propelled."

"The motive force to effect propulsion on railways are termed "gaso-pneumatic, that is to say, on a line of railway of the "ordinary construction or any modification thereof is laid a "series of common gas mains or pipes of any convenient

" diameters; these are laid, if on a double track, in a centre line " between the two tracks of railway at distances of about two " miles. A branch or branches of any required length is laid " from said mains, and to these where they occur is connected " and established the gas explosive apparatus or engine or parts " thereof described in his former Specification, being fixtures " upon said lines of railway. From the engine or apparatus " so to be constructed is transferred the power induced at each " station along a line of said railway in opposite directions by " the effect of the explosive mixture of gases and air, the former " supplied through said mains from gasometer stations placed at " convenient distances along said railway."

[Printed, 6*s.* 8*d.* Drawings. See Mechanics' Magazine, vol. 34, p. 299; Inventors' Advocate, vol. 4, p 213; Engineers' and Architects' Journal, vol. 4, p. 174. Rolls Chapel.]

A.D. 1840, October 15.—N° 8659.

PETTIT, ROBERT.—" Improvements in railroads, and in the " carriages and wheels employed thereon."

" Four or more horizontal wheels are employed mounted on " vertical axles underneath the carriage, and to prevent their " rattling against the rails," rope, yarn, or other soft substance is inserted " into a groove round the periphery of each wheel, these " wheels may bear against the inner side of the parallel rails, and " by revolving freely on their axes keep the carriage in its proper " position on the line of railway. The rails are merely flat bars " or plates of iron fastened on to longitudinal sleepers or blocks " of wood, and the guide rail in the middle of the line is that " against which the horizontal wheels bear.

" This is employed for the purpose of keeping the engine and " carriages in their proper positions, and is equidistant from both " the side rails.

" This peculiar construction of railway will be found useful when " one line of road branches off from another the only difference " being the addition of top flanges, which flanges will restrain " the horizontal wheels from being raised out of their proper " position, and prevent their passing over the top of the rail from " any accidental cause."

[Printed, 1*s.* 6*d.* Drawings. See Mechanics' Magazine, vol. 34, pp. 321 and 350; Inventors' Advocate, vol. 4, pp. 262 and 330; Engineers' and Architects' Journal, vol. 4, p. 159. Petty Bag.]

A.D. 1840, October 15.—N° 8663.

PINKUS, Henry.—" An improved method of combining and " applying materials applicable to formation or construction of " roads or ways."

" In order to form the paved ways for the use of superstructures " of wood, stone, or similar material a foundation " is formed " of " rough close-set rubble stones," broken stones, or bricks. " The " upper interstices between the stones should be filled up com- " pactly with chips of broken stones, so as to form a compact " mass, which when laid along a road should have a proper " curvature for drainage equal to a declination about nine inches " in twenty feet.

" The surface should be rammed or rolled so as to form an " even surface, in beds of foundations so formed buttress sleepers" are laid ; " these constitute the abutments of arches of short span, " by which the road is divided transversely. Transums or ties " may be placed at convenient distances to maintain parallelism " of the buttress sleepers when neccessary on loose soils, or the " buttress may be laid on ends of piles.

" When the brick foundation is used, the textile super- " structure should be so applied as that the rods should " cross the centres of the squares that are filled in with earth or " stones.

" On lines of railway on embankments or cuttings, where " loose soil occurs, the textile pavement may be applied with " advantage in lieu of ordinary ballasting ; the railway bars may " lay along on the pavement.

" In order to facilitate the impelling of carriages or trains over " ascending planes," a fixed rail or centre rail is " combined with " an inclined plane on a road or railway by laying down a con- " tinuous sleeper, on which is fixed a rail, and which may be " placed on the ascending tracks of railways.

" At the foot of the plane the rail is tapered to a thin section " and gradually increases for one hundred feet. To a locomotive " engine is applied an adhesion apparatus so that when the " locomotive approaches the foot of an inclined plane, the bar " entering between the adhesion wheels, and gradually getting " under will prevent any shock on the entry of the rail. The " adhesion of these wheels on the rail will assist the bite or

" adhesion of the driving wheel of the locomotive, and enable " the engine by its power to overcome the gravity of the load " when on the inclined plane. When the train reaches the " summit of the incline, the rail gradually decreases in width, " and is discontinued, and the adhesion wheels" are made to " roll upon each other."

[Printed, 4*s*. 2*d*. Drawings. See London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 251; Mechanics' Magazine, vol. 34, p. 334; Inventors' Advocate, vol. 4, p. 261. Rolls Chapel.]

A.D. 1840, November 12.—N° 8699.

BIRCH, EUGENIUS.—"Improvements applicable to railroads, " and to the engines and carriages to be worked thereon."

"In arranging parts of railways, and also apparatus applied to " engines and to carriages moving thereon, that the steam of " locomotive engines may be wholly cut off from the engines, or " regulated or affected by the movement of the locomotive carriage " along the railway, and parts of the apparatus may be so arranged " that persons stationed at particular parts of a line of railway " may bring such apparatus into use; and further, breaks may " be brought into action independently of as well as by persons " travelling with engines and carriages, thus materially reducing " the possibility of accidents from neglect or want of judgement " of the persons conducting trains of carriages on railways; and " lights may be shown and whistles sounded by apparatus applied " to railways, and to the engine or carriages moving thereon, to " be brought into use by the movement of the engines and " carriages along a line of railway."

[Printed, 1*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 34, p. 399; Inventors' Advocate, vol. 4, p. 325. Rolls Chapel.]

A.D. 1840, December 16.—N° 8741.

BEATTIE, JOSEPH.—" Certain improvements in locomotive " engines, and in carriages, chairs, and wheels for use upon " railways, and certain machinery for use in the construction of " parts of such invention."

"In the bottom of the iron part of the chair there is a space " left out in the castings, into which is placed a piece of compressed wood, with the fibre parallel to the plane of the base of " the chair upon which the rail is seated; there is also a space

" cast out of the inside cheek of the iron part of the chair, " in which is also placed a piece of wood, then the key is " driven in."

[Printed, 1*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 35, p. 56; vol. 65, p. 465; and vol. 67, p. 6; Inventors' Advocate, vol. 5, p. 22. Petty Bag.]

A.D. 1840, December 18.—Nº 8745.

HANDCOCK, Elias Robinson.—" Certain improvements in " mechanism, applicable to turn-tables for changing the position " of carriages upon railroads;" consisting in " a vertical bearing " shaft, which is fixed into the foundation frame by its lower end, " which is partly tapered, and having at its upper end a steel " centre step, and two gun-metal collars, which fit loosely around " the vertical bearing shaft, and within recesses made in the outer " cylinder. A circular flange is bolted to the centre of the table " or platform at its under side. At the middle of this circular " flange is the conical pivot, the apex of which is formed of steel, " and works in the stud step. A massive flange is cast to the " outer cylinder, to which are bolted a series of stay bars, the " upper ends of which are bolted at equidistant points near the " periphery of the table or platform. The effect of these stays is " a general support and stability to the table or platform."

[Printed, 2*s*. Drawing. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 126; Mechanics' Magazine, vol. 35, p. 9; Inventors' Advocate, vol. 4, p. 405. Rolls Chapel.]

A.D. 1840, December 23.—Nº 8750.

THORNTON, George.—" Certain improvements applicable to " railways, locomotive engines, and carriages." The patentee says, " the original gauge of four feet eight inches and a half, and " the more recent improvement of five feet, have both been found " in practice to be too narrow to admit of a proper and free " arrangement of the machinery of the locomotives, and also " creating at great speeds an unpleasant transverse oscillation of " the carriages, with the liabilities at high velocities to fly off at a " tangent from quick curves. On the other hand, the seven " feet gauge appears to entail too great a weight in the con- " struction of the locomotives and carriages, and consequently a " proportionate expence. This increased weight and width of " gauge also involves a considerable increase of outlay in land

" and construction of the railway and bridges. Looking, then, " at the question fairly, between the existing gauges of rails, it " would seem desirable that some medium or national width " should be adapted, and the simple gauge of six feet (or there- " abouts) presents itself as admitting a desirable width for a con- " venient arrangement of machinery in the construction of the " locomotives and carriages without extreme of weight or expendi- " ture in any department."

[Printed, 1*s*. 2*d*. Drawings. See Repertory of Arts, vol. 17 (*new series*), p. 345; Mechanics' Magazine, vol. 34, p. 14; Inventors' Advocate, vol. 5, p. 4. Rolls Chapel.]

A.D. 1841, January 28.—N° 8818.

HARRISON, WILLIAM CURRIE. — " An improved turn-table " for railway purposes." It consists " in supporting the revolving " plate or upper platform of the turn-table, as also its stays, " braces, arms, and supports on the top of a fixed post, well " braced, and resting on or planted in the ground, the top of " which post forms a pivot for the table to turn on, while support " arms radiating from a framework (the weight of which is also " sustained on the post) moving round the bottom part of the " post with friction rollers, and fastened to the outer edges of the " plate, stay the plate at all sides, and keep it steady to receive " the superincumbent weight of carriages, or whatever is to be " turned upon it."

[Printed, 8*d*. Drawings. See Mechanics' Magazine, vol. 35, p. 173; Inventors' Advocate, vol. 5, p. 84; McRory's Reports, vol. 1, pp. 4, 11, and 13; Common Bench Reports, vol. 12, p. 831; Law Journal (*Common Pleas*), vol. 22 (*new series*), p. 57; Jurist, vol. 17, p. 304; Law Times, vol. 19, p. 158; and vol. 20, p. 112. Rolls Chapel.]

A.D. 1841, February 8.—N° 8837.

OLDHAM, ELISHA.—" Certain improvements in the construction " of turning tables to be used on railways," and consist " in " mounting the platform or table at its centre on an upright pin " or pivot, the sides of the platform or table being supported by " stationary antifriction rollers when a heavy weight is brought " on to it."

[Printed, 6*d*. Drawings. See London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 93; Mechanics' Magazine, vol. 35, p. 176; Inventors' Advocate, vol. 5, p. 102; Engineers' and Architects' Journal, vol. 4, p. 429. Petty Bag.]

A.D. 1841, February 8.—N° 8840.

SCOTT, JOSEPH.—"Improvements in constructing railways, "and in propelling carriages thereon, which improvements are "applicable to raising and lowering weights;" consisting in a "mode of applying to railways cog wheels at intervals along the "line of railway, such cog wheels receiving a continuous rotatory "motion by suitable gearing; and further, such cog wheels are "placed at such a distance apart as at all times to have one of "them in operation with a toothed rack applied to one of the "railway carriages of a train, and thus are the carriages pro"pelled."

[Printed, 1*s*. Drawings. See Mechanics' Magazine, vol. 35, p. 176; Inventors' Advocate, vol. 4, p. 203; and vol. 5, p. 99. Rolls Chapel.]

A.D. 1841, February 15.—N° 8847.

RANSOME, JAMES, and MAY, CHARLES.—"Improvements in "the manufacture of railway chairs, railway and other pins or "bolts, and in wood fastenings and treenails," relating, "first, to "a mode of casting railway chairs; secondly, to a mode of making "railway and other pins or bolts, and wood fastenings and tree"nails, by forcing them into moulds so formed as to retain them "under compression for any required length of time, and by "subjecting them to heat when under compression in moulds."

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 16 (*new series*), p. 209; Mechanics' Magazine, vol. 35, p. 206; Inventors' Advocate, vol. 5, p. 117; Engineers' and Architects' Journal, vol. 5, p. 200. Rolls Chapel.]

A.D. 1841, June 5.—N° 8977.

GIBBS, JOSEPH.—"Certain improvements in roads and rail"ways, and in the means of propelling carriages thereon." "The "first consists in constructing the bridges or viaducts which may "be required in the formation of roads and railways partly in the "manner of ordinary arc bridges, and partly in the manner of "the suspension bridge, so as to combine in one structure the "advantages of both systems of construction without any abut"ments being required to resist the thrust of the arched bridge, "or any land ties to hold the suspension chains in their place. "The second consists in making common roads and tramways of "wooden blocks, laid and combined in such a manner that every

" block shall receive a support from each of those adjoining it, by " means of key pieces, made either of wood or iron. The seventh " is for causing carriages to run on common roads, and is effected " by laying down rackways of blocks of stone or other suitable " materials, as now practised, except that the joints are to be " laid askew, to give a smoother motion to the carriage wheels " which are intended to run thereon between the blocks; a continuous longitudinal piece of wood is laid, the upper edges " of which are chamfered or bevilled off, on this a wheel runs, " only touching the chamfered edges; the wheel is provided with " a flange on each side, but the flanges do not touch the sides of " the timber. This wheel runs loose on the axle, and the hole " through which the axle runs is larger than the diameter of the " shaft on which it is placed, by this contrivance the wheel always " drops upon upon the rail, and guides the carriage wheels on " the blocks, consequently they do not require flanges; but in " order to keep the guide wheel in its place on the shaft, a plate " of iron accurately turned and keyed thereon upon each side of " the guide wheel; these plates of iron, or discs, always keep the " wheel in its proper place, but allows the guide wheel to sink " down between them upon the centre rail. And the ninth is a " railway formed of longitudinal and transverse sleepers, with " rails of any approved form. Upon some of the transverse " sleepers, at convenient distances, are fixed bearings for friction " wheels or drums in pairs, which wheels or drums serve as " bearings for a cylindrical shaft of wood, or other material, " which is thus enabled to be made in a continuous length for " any distance that may be required. Attached to one or both " ends of a carriage is a wheel, the outer surface of which is in " contact obliquely with the surface of the shaft, and consequently " has its axis oblique to the axis of the said shaft," there is also " a contrivance for raising or depressing the wheel when required, " being furnished with handles for that purpose." "A slow " motion being given to the shaft by any approved means, and " thereby communicated to the wheel, the carriage will be propelled " with a great velocity, which may be increased or diminished " according to the angle at which the wheel is set to the shaft, " and to the proportion that the diameters of the said wheel and " shaft bear to each other."

[Printed, 4*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 35, pp. 465 and 490; and vol. 36, p. 1. Rolls Chapel.]

A.D. 1841, July 7.—N° 9017.

ONIONS, George.—" Improved wheels and rails for railway " purposes," and " consists in an arched base manufactured of " common cast iron, with a groove running along the centre, and " into which groove a rail, made either of iron cast from Cumber- " land or Lancashire ore, and afterwards rendered malleable by " annealing or made of wrought iron, is affixed. The base of " such rail is cast singly or doubly; if doubly, by means of " connecting substances of iron."

[Printed, 4*d*. No Drawings. See Mechanics' Magazine, vol. 36, p. 75; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 258. Rolls Chapel.]

A.D. 1841, December 16.—N° 9181.

AUSTIN, Charles Edward.—" An apparatus for what is " commonly called changing the line on railways."

[No Specification enrolled.]

A.D. 1842, January 22.—N° 9231.

MERTENS, Antoine.—(*A communication.*)—" Improvements " in covering surfaces with wood." " The pieces of wood, which " may be of any shape or form, but should be all of the same " depth, are placed in a frame side by side, and firmly wedged or " screwed into close contact. Grooves are next cut on the under " surface, extending from side to side, and traversing each of the " pieces of which the block is composed, and in these grooves are " inserted laths or tongue pieces. Other grooves are then cut " transversally to the former, and partially cutting through the " tongue pieces; and into these," also tongue pieces are inserted, " and asphaltum, mastic, gypsum, or any other suitable " cement is run into the grooves and poured over the under " surface, which completes the process. The pieces of wood may " be placed with their fibres vertical or horizontol, according to " the wear to which the surfaces are exposed." The improvements " also consist " in a method of covering cast-iron rails for railways, so as to protect them in a great measure from the shocks and the consequent risk of fracture to which they are exposed when the wheels of the carriages run in immediate contact with the iron rail; to apply this, the rail is formed with a groove on its upper surface of a dovetail form, and filled with blocks of wood, placed with the fibre vertical, of about three to five inches long, and cut to fit the groove, so that the whole of it is covered by the wood.

[Printed, 6*d.* Drawings. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 94. Rolls Chapel.]

A.D. 1842, March 21.—N° 9298.

JESSOP, SYDNEY.—" An improved mode of preparing wrought " iron intended for wheel tires, rails, and certain other articles." " In carbonizing or hardening wrought iron after it has been " formed into shapes applicable to wheel tires or rims, to rails, to " plates, or to trams, switches, or the like articles, in such manner " and on such parts as will cause them to present hardened " wearing surfaces."

[Printed, 1*s.* Drawings. See Record of Patent Inventions, vol. 1, p. 139. Rolls Chapel.]

A.D. 1842, August 31.—N° 9455.

GUITARD, CHARLES FREDERICK.—" Certain improvements in " the construction of railways." " In substituting sleepers of " iron, of such qualities and constructed in such manner that " they are free from the disadvantages of, and both cheaper and " much more durable than the wooden ones, and in combining " with the said sleepers, iron chairs suitably adapted thereto. Of " these improved sleepers and chairs, eleven different varieties are " represented in the Drawings."

[Printed, 2*s.* Drawings. See Mechanics' Magazine, vol. 39, pp. 274 and 433; Practical Mechanics' Journal, vol. 4, p. 29. Rolls Chapel.]

A.D. 1842, September 16.—N° 9473.

JAMES, WILLIAM HENRY.—" Certain improvements in railways " and carriageways, railway and other carriages, and in the modes " of propelling the said carriages; parts of which improvements " are applicable to the reduction of friction in other machines." " In forming an elevated railway or carriageway for the convey- " ance of passengers and goods by means of a series of parallel " rods, bars, wires, or strips of metal, or other suitable materials, " carried over a series of horizontal intermediate spring bearings, " placed at intervals across the line of railway, on post, pillars, or

" other suitable supports firmly fixed in the ground; such rods, " bars, wires, or strips being constantly kept in a state of tension " by mechanical means;" and "in forming an elevated rail or " carriageway by building two walls parallel to each other, and " of equal height, and placed at a distance apart equal to the " breadth of the proposed rail or carriageway. The space between " the walls may be left vacant, or arched over," or may be " filled " up with concrete or other suitable materials, so that the entire " structure shall form one solid wall."

[Printed, 1*s.* 8*d.* Drawings. Rolls Chapel.]

A.D. 1842, December 3.—N° 9535.

WILD, Charles Heard.—" An improved switch for railway " purposes." " In the use of safety tongue rails, either fixed and " the ordinary rails moveable into line with them, or themselves " moveable into line with the ordinary rails; one main feature of " the invention is, that whatever the mechanical means adopted " may be to effect either of these movements, those means must " be such as will cause the moveable rails to move through certain " different degrees of space, though these means are acted upon " by one lever always moving through one uniform degree of " space."

[Printed, 1*s.* 6*d.* Drawings. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 271; Engineers' and Architects' Journal, vol. 10, p. 9. Rolls Chapel.]

A.D. 1842, December 29.—N° 9580.

WYDROFF, Baron Victor de.—" Improvements in the con" struction of railways, and in wheels to run on railways, and in " apparatus for clearing the rails." " Round blocks " are placed every two yards on well rammed ground or a prepared foundation, " and transverse sleepers of cast iron made hollow, in which there " is a slope or cutting destined to receive the longitudinal bearers " at a right angle. These bearers are twelve inches square, and " are placed in the slope of those blocks or iron sleepers in such a " manner that one of the diagonals of the square is perpendicular " to the surface of the earth, and are elevated about three inches " above the ground, and the rails about eighteen inches. The " blocks are kept in the places by means of wrought-iron bars " which extend across them and the bearers from rail to rail.

" These bars are fastened by pins inside and nuts outside. The " transverse sleepers are placed at the joints of the bearers, and " are kept in their places by iron bars, thus forming together a " perfect framework above the ground, and thus all parts of " the railway may readily be examined & repaired. On the " top angle of the bearer, slightly squared, is laid the hollow " rail, which being thus placed presents at all points of its " surface the same elasticity of resistance, and this form of rail " will resist considerable pressure, and cannot readily be " flattened."

[Printed, 1*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 39, p. 45. Rolls Chapel.]

A.D. 1843, January 11.—N° 9582.

BAILEY, Crawshaw.—" Certain improved constructions of " rails for tramways and railways," " in a peculiar form given to " the rails, by which they are enabled to answer the double purposes of conducting locomotives and other carriages having the " ordinary kinds of railway wheels with a flange on one edge, or " wheels without flanges."

[Printed, 6*d*. Drawings. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 254. Petty Bag.]

A.D. 1843, May 16.—N° 9727.

KETTLE, John Lucena Ross, and PROSSER, William.— " Improvements in the construction of roads and in carriages to " run thereon." " The object of the invention is to obtain surfaces of wood for the plain wheels of carriages to run on " in combination with a guide between the rails, so that " passengers " will be less subject to noise & shocks; wood will also be found " to offer more adhesion for the driving wheels of locomotive " carriages, consequently less attention will be required to getting " good gradients."

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 3 (*enlarged series*), p. 154; Mechanics' Magazine, vol. 40, p. 206. Rolls Chapel.]

A.D. 1843, June 22.—N° 9797.

ELLIS, Samuel.—" Certain improvements in weighing machines " and in turntables to be used on or in connexion with railways, " and in weighing machines to be used in other situations."

" The doing away with friction rollers for the support of the " outer edge of the platform and allowing the said edge, when " the platform is not required to be in motion, to rest firmly " and steadily on a fixed stationary bearing, and when required " to be put in motion, the raising of the said platform by a lever " or levers, and the lifting of it on to a central bearing point or " pivot connected with a steelyard or other weighing apparatus " when required to be used as a weighing machine, and ready to " be turned round when required to be used as a turntable, thus, " for the first time, combining a weighing machine with a turn-" table for railway purposes."

[Printed, 1*s*. 8*d*. Drawings. See Repertory of Arts, vol. 5 (*enlarged series*), p. 137; Patent Journal, vol. 2, p. 645; Transactions of the Society of Arts, vol. 55, p. 131. Rolls Chapel (*with Disclaimer*).]

A.D. 1843, July 26.—N° 9855.

EYRE, EDWARD.—(*A communication.*)—" Certain improvements " in railways, and in the machinery or apparatus employed " thereon," and relates " to the formation of embankments by a " cheap and quick method, and also in constructing the railway " upon a different plan by employing an additional or centre " rail, upon which the driving wheel of the engine runs, the " centre rail being serrated, fluted, or rasped transversely, or laid " down plain, according to circumstances."

[Printed, 10*d*. Drawings. Petty Bag.]

A.D. 1844, February 24.—N° 10,078.

AITKEN, JOHN.—" Improvements in atmospheric railways." " First, to obtain the requisite vacuum in the traction pipes of " atmospheric railways by causing them to be filled with water, " and then, by means of long eduction pipes descending from the " traction pipes to carry off such water, leaving a better vacuum " than can with convenience be obtained by air pumps; or in " place of such length of eduction pipes, pumps " are used, " with short eduction pipes. And, secondly, the use of water for " covering the longitudinal valve of the traction pipe so as to " retain the vacuum obtained therein."

[Printed, 8*d*. Drawings. See Repertory of Arts, vol. 4 (*enlarged series*), p. 217; Mechanics' Magazine, vol. 41, p. 190; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 318; Engineers' and Architects' Journal, vol. 7, p. 368. Rolls Chapel.]

A.D. 1844, March 6.—N° 10,093.

BARLOW, William Henry.—" Improvements in the construction of keys, wedges, or fastenings for engineering purposes." In making them " of hollow metal, so that a degree " of elasticity may be obtained, together with strength and " lightness."

[Printed, 8*d*. Drawings. See Repertory of Arts, vol. 4 (*enlarged series*), p. 238; Mechanics' Magazine, vol. 41, p. 394; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 400; Engineers' and Architects' Journal, vol. 7, p. 369. Rolls Chapel.]

A.D. 1844, March 20.—N° 10,115.

CHARLIEU, André Drouot de.—(*A communication.*)—" Improvements in rails for railways, and in wheels for locomotive " carriages." " A mode of manufacturing rails for railways by " applying to the sides of the rail an angular flange in order to " prevent the wheels of the carriage from running off the rail, " and may be either a part of the rail or a separate piece, and " affixed by means of bolts or pins to the rail; also in applying " to wooden or other rails of the same shape flat metal bands or " strips of iron in such manner that the pressure of the wheel " will take place on those parts, so that the ordinary rail will not " have to be made so thick; these bands may be made of iron or " cast steel or other thin metal."

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 4 (*enlarged series*), p. 355; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 241; Engineers' and Architects' Journal, vol. 7, p. 407. Rolls Chapel.]

A.D. 1844, April 30.—N° 10,167.

SAMUDA, Jacob, and **SAMUDA**, Joseph D'Aguilar.—" Certain improvements in the manufacture and arrangement of " parts and apparatus for the construction and working of atmospheric railways." " A method of obtaining a vacuum to work " atmospheric railways by using close reservoirs filled with water " in conjunction with tanks placed at different altitudes, and " allowing the water to run out of the reservoirs into such tanks " and returning the water back to the reservoirs from such altitudes, whereby less power is required to force the water back " into the reservoir than if it all run out at one level. When the " vacuum requires to be formed in the main a valve is opened

“ and the water descends by its gravity into the reservoir till the
“ pressure of the water in the reservoir combined with the atmosphere
“ closes the valve, and then a float having by this time
“ descended low enough, a tappet on the float rod disengages a
“ catch and allows” another “valve to open and the water to
“ flow into the reservoir, the object of filling separate reservoirs
“ with the water being to prevent the water descending lower
“ than is absolutely necessary, and thus avoid the cost of pumping
“ it back into the vessel from a lower level than is requisite;”
also “in a mode of arranging level crossings for the atmospheric
“ railway as follows:—A cylinder fitted with a piston is fixed at
“ each level crossing and has its lower end connected to the main
“ pipe, so that when a vacuum is formed in the main pipe the
“ piston will descend by the pressure of the atmosphere which is
“ admitted above the piston, and the piston, acting by means of its
“ rod and the lever, turns a long axis on its centre, and thereby
“ raises the cover of the main pipe and allows the arm of the
“ train piston to pass; also in the method of completing the joint
“ of two main pipes by the insertion of a thin plate of metal into
“ the body of the metal of the pipe at the joints.”

[Printed, 2*s*. 8*d*. Drawings. See Repertory of Arts, vol. 5 (*enlarged series*), p. 65; Artizan, vol. 4, p. 1; Engineers' and Architects' Journal, vol. 8, p. 119; Law Times, vol. 5, p. 141. Rolls Chapel.]

A.D. 1844, April 30.—N° 10,168.

MELVILLE, JOHN.—“Improvements in the construction and
“ mode of working railways.” “The rails on which the carriages
“ run are formed of timber, and the upper surface is flat, with a
“ plate of iron for the wheels to run upon, the surface of which
“ plate is slightly inclined at the curves, so that the inner edge is
“ rather lower than the outer ones. The wheels of the carriage
“ are formed without flanges, but the carriage is guided and
“ retained on the rails by means of two horizontal wheels connected
“ to the frame of the carriage, and running in a groove
“ formed midway between the rails, by means of two wooden
“ rails. At the curves it will be desirable to fix an iron plate for
“ the guide wheels to run along on the inner side of the outer
“ central rail.”

[Printed, 1*s*. 2*d*. Drawings. Engineers' and Architects' Journal, vol. 7, p. 421. Rolls Chapel.]

A.D. 1844, June 21.—N° 10,232.

FONTAINEMOREAU, Pierre Armand, le Comte de. — (*A communication.*)—" A new mode of locomotion, applicable to rail-" road and other ways." " In the construction and arrangement " of a tube placed in the direction of the railway, in such manner " as to supply air locomotives running thereon with air as a " motive power, by maintenance of an air-tight yet progressive " constant communication between the tube and the locomotives. " The air may be used either in a compressed or rarefied state, and " the locomotives " having " two cylinders with their rectilinear " alternate movements, and the mechanism for the transmission " of motion to the moving axis," as in common locomotives, " or " may be made similar to those having rotary engines. The tube " is constantly filled with compressed air in one method, with " rarefied air in the other," and " has at certain distances orifices " closed by ordinary valves. In one method the air is compressed " into the tube by means of a stationary power putting in action " pneumatic forcing pumps. The tube, the valves of which open " inwards, will do the service of a boiler, and should be as long " as the railroad, and be constantly supplying the locomotive with " the compressed air necessary to its motion, and that during its " rapid course. In the other method the air is exhausted by " suction air pumps, and the tube, the valves of which open " outwards, will do the service of a condenser, and the atmospheric " air in endeavouring to force entrance will press upon the pistons " and put them in motion, thus causing the engine to run."

[Printed, 1*s*. Drawings. Petty Bag.]

A.D. 1844, July 24.—N° 10,270.

BROCKEDON, William. — " Improvements in covering the " valves used when propelling by atmospheric pressure, and in " covering the sleepers of railways," by " adapting and applying " a preparation of india-rubber " and sulphur " to the surfaces of " valves used on the pipes or tubes of atmospheric railways, and " combining " it " with the upper surfaces of sleepers of railways, " so as to produce and elastic covering between the sleepers and " the rails, and the sleepers and the chairs."

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 5 (*enlarged series*), p. 241; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 183; Artizan, vol. 3, p. 70; Engineers' and Architects' Journal, vol. 8, p. 159. Rolls Chapel.]

A.D. 1844, September 12.—N° 10,317.

FLOCKTON, WEBSTER.—" Certain improvements in machinery " or apparatus for sweeping or cleansing streets, roads, or ways," consisting " in novel machinery by which a series of brushes con- " nected to a carriage may be made to move horizontally over " the street, road, or way in a circular direction as the carriage " advances, for the purpose of sweeping the dirt into a heap by " the side of the carriage, from whence it is to be afterwards taken " up by hand labor into mud carts or other suitable receptacles. " Which machine may be applied to clear the rails of railways " from dirt and snow by attaching it in front of the railway " tender or engine."

[Printed, 4*d.* Drawings. London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 21. Petty Bag.]

A.D. 1844, October 22.—N° 10,358.

NASMYTH, JAMES, and MAY, CHARLES.—" Improvements " in working atmospheric railways, and in machinery for con- " structing the apparatus employed therein." " The invention " relates to the means of obtaining the requisite vacuum in the " traction pipe of atmospheric railways," whereby " a greater " extent of vacuum can be instantaneously obtained, and a " certainty of more quickly closing the valve, so as to prevent " leakage consequent on any want of power of the atmosphere, " owing to the partial state of vacuum."

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 5 (*enlarged series*), p. 345; Mechanics' Magazine, vol. 42, p. 430; and vol. 43, p. 136; Engineers' and Architects' Journal, vol. 8, p. 169. Rolls Chapel.]

A.D. 1844, December 18.—N° 10,443.

PROSSER, WILLIAM, and CARCANO, JEAN BAPTISTE.— (*A communication.*) — " Improvements in working atmospheric " railways." " In so arranging the valves used for closing the " longitudinal openings in the traction pipes that they shall open " inwards, combined with the use of suitable transverse valves or " slides at proper intervals in the traction pipes for the air to " press against when moving the pistons. And the application " of reservoirs for receiving air in a compressed state to such

" traction pipes;" and also in " causing the air which has been " used to be returned back into reservoirs to be again used."

[Printed, 6*d.* Drawings. See Repertory of Arts, vol. 6 (*enlarged series*), p. 81; Mechanics' Magazine, vol. 43, p. 105; Practical Mechanics' Journal, vol. 1, p. 157; Artizan, vol. 4, p. 3; and vol. 6, p. 191; Engineers' and Architects' Journal, vol. 8, p. 226. Rolls Chapel.]

A.D. 1845, January 11.—N° 10,457.

GRIFFITHS, ROBERT.—" Improvements in the manufacture of " bolts, railway pins, spikes, and rivets." "The raising or forming " of heads on pin bolts, rivets, &c. by means of a reciprocating " beam or lever, without having a bolt or other guides for fixing " the tools."

[Printed, 1*s.* 2*d.* Drawings. Rolls Chapel.]

A.D. 1845, January 14.—N° 10,467.

LACY, HENRY CHARLES, and BUCK, GEORGE WATSON.— " A new manufacture for and method of sustaining the rails of " railways." "The invention consists in adapting and applying " plate, or sheet, malleable, or wrought iron," bent to a certain angle, " for the purpose of sustaining the rails of railways, either " in whole length cross sleepers in lieu of wooden sleepers, or by " short or half sleepers, answering for the stone blocks," and in fastening the chairs by means of pins placed in holes punched through the chair, sleeper, and block.

[Printed, 8*d.* Drawings. See Repertory of Arts, vol. 6 (*enlarged series*), p. 99; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 394; Engineers' and Architects' Journal, vol. 8, p. 256. Rolls Chapel.]

A.D. 1845, January 16.—N° 10,471.

DUBERN, HENRY ADOLPHE.—(*A communication.*)—" Improve- " ments in atmospheric railways." " An improved mode of con- " structing the longitudinal valve of the propelling tube" to close it " by two plates of steel or springs. These are bent in " form of segments of a circle, and are placed with their convex " sides towards each other, and meet at their upper ends, the " parts which are in contact being very small," and " are fixed " upon the tube, a concave bed or seat" being made " to receive" them. "The springs project a distance of an inch and a half or " two inches only above the longitudinal opening, and they are

" fastened to the tube at their lower extremities by means of " screws and iron bars, which press equally upon them throughout " their lengths; a space to be filled with soft grease is formed " along the upper side of the tube, and rises about a quarter of " an inch above the metal plates or springs on each side of them, " so as perfectly to enclose them."

[Printed, 8*d.* Drawings. Petty Bag.]

A.D. 1845, March 13.—N° 10,556.

DUNN, THOMAS.—"Certain improvements in or applicable to " turntables, to be used on or in connection with railways." " First, in the application to such railway turntables only as have " their platforms at all times supported in a greater or less degree " on friction rollers of such apparatus as will, by being placed in " contact with the platform, give support and stability to it where " one or more of the friction rollers may have become lower than " the level of the rest, leaving the other parts of the platform to " be supported by the friction rollers, so that when a carriage " passes over the table, the platform is prevented from shaking " so violently, and from making so loud and jarring a noise as " those turntables do which are in general use; and when it is " required to turn such platform the apparatus is changed in its " position, so as to allow the platform to be turned on the rollers. " Secondly, in constructing the curb or stationary casing of the " platform of a turntable, and also the platform itself, which has " to work in it in the form of a ring, which form admits of a " portion of the permanent line of railway being left within the " curb and platform, whereby the carriages of a train are less " liable to run off the line in case the rails on the platform are " not left in a line with the permanent rails on each side, and " within the table, and by the platform being so short in its " bearings it is enabled to sustain a greater weight than ordinary " platforms are without being otherwise damaged. Thirdly, in " constructing the general surface of the platform of a turntable " of metal on a level with the tops of the permanent rails, and in " forming grooves in the platform for the flanges of the wheels to " pass into, so that if the grooves in the platform should not be " in a position to receive the flanges of the carriage wheels as " they pass from the permanent rails, such wheels will have to

" mount on the surface of the table the height of the wheel " flanges only, and not the height of a rail, which is the case in " turntables as at present constructed. And, lastly, in the appli- " cation of a guide ring or wheel placed on the surface of the " platform of a turntable, and in guide rings or wheels placed " near to a turntable within or outside of the rails of a line of " railway, in such positions that if the wheels of a carriage have " only got a short distance off the rails by the platform not being " in the position it ought to be for a train to pass over it, such " rings or wheels will guide them on to the rails again."

[Printed, 2*s.* 4*d.* Drawings. See Artizan, vol. 6, p. 110. Rolls Chapel (*with Disclaimer*).]

A.D. 1845, April 14.—N° 10,609.

HADDAN, JOHN COOPE.—" Improvements in preparing sleepers, " chairs, and spikes, and in constructing wheels for railways." " The improved railway sleepers consist of pieces of wood of the " ordinary description and dimensions used for transverse railway " sleepers, but cut and prepared for the reception of chairs, and " of rails without chairs; thus, two spaces are made by cutting " away portions of the round or convex sides of the wood for the " reception of two chairs, in such manner that the seats for the " chairs may have shoulders, and may be level and in the same " plane, and sufficiently large to receive the chairs intended to be " used, and must be placed at a proper distance apart, according " to the guage of the railway for which the sleeper is intended. " The improvement in the construction of railway chairs consists " in making one end of such chairs perpendicular to the base, " and of larger dimensions than heretofore, for the purpose of their " being more firmly held in their proper positions by the improved " sleepers, and in making such chairs with holes for spikes or " other fastenings; which holes are made oblong, so that the " fastenings may be freed from all the lateral pressure outwards " which the passing of the railway carriage has a tendency to " produce, the chair being maintained in its proper position by " the outer shoulder of the seat or space in which it is placed; " but if the chair is intended to be fastened with the improved " spikes, the holes must, in addition to being made oblong, also " be made countersunk."

[Printed, 2*s.* Drawings. Rolls Chapel.]

A.D. 1845, May 10.—N° 10,662.

PROSSER, William, and BRETT, Jacob.—" Improvements " in railways, and in propelling railway carriages." " A peculiar " formation of the valves as applied to air locomotives, videlicet, " two strips of soft elastic leather abutting against each other, " either by the combined action of longitudinal springs and the " atmospheric pressure, or simply by the external pressure of the " air, and supported on a perforated bridge. The substitution of " a series of apertures for a continuous slit or chase, by which " means collapsion is prevented even with very thin metal. Two " valves on one pipe, thus making one pipe answer for a double " line of rails. The expansive action of air in the locomotive " cylinders causing them to force air into a reservoir on the carriage " or locomotive, thus making the compressed air act as a " break, and subsequently as an independent source of power to " start the train by working the cylinders. Attaching the slide " pipe to the locomotive by means of flexible tubes prepared so as " to prevent collapsion, and by connecting rods, &c., having a " certain degree of elasticity," and " coating the main with non-" conducting substances to prevent the absorption of heat by " the rarified air."

[Printed, 1*s.* 10*d.* Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 1; Engineers' and Architects' Journal, vol. 8, p. 385. Rolls Chapel.]

A.D. 1845, May 10.—N° 10,663.

CHAPMAN, John Mellar.—" Improvements in the manu-" facture of rails and other parts of railways."

[No Specification enrolled.]

A.D. 1845, May 17.—N° 10,671.

MAC DOUGALL, Alexander.—" Certain improvements in the " method of working atmospheric railways." " The motion of the " piston is transmitted to the carriage by a traction pipe or tube, " furnished on the top side with a longitudinal opening of a " trough shape, proportioned to the size of the pipe. The trough " is furnished with a pliable substance which covers the opening " of the tube, and is attached to flanches. The substances suit-" able for the pliable covering are leather, caoutchouc, vulcanized

" caoutchouc, Macintosh cloth, oiled cloth, or others which are " impervious to air, and combine pliability with tenacity and " durability." Also " a method of covering the opening in the " pipe with a flexible metallic plate. The piston is furnished with " an armature to connect it with the carriage, and through which " an opening is made to admit of the passage of the flexible metallic covering of the groove." Also " a new method of effecting " the production of the requisite vacuum by means of a fan " and compressed air behind the piston.

[Printed, 4*d*. Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 129. Rolls Chapel.]

A.D. 1845, June 5.—N° 10,707.

PALMER, William.—" Improvements in working atmospheric " railways, and in lubricating railway and other machinery." " The " application of tallow, oil, or other fatty matters or oils prepared " in the form of soap, insoluble in water by means of litharge or " other metalline matters to line the interior surfaces of the traction pipes of atmospheric railways."

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 114; London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 428; Engineers' and Architects' Journal, vol. 9, p. 92. Rolls Chapel.]

A.D. 1845, June 23.—N° 10,731.

CLARKE, Thomas, and VARLEY, John.—" An improvement " on the atmospheric system of propulsion, which is also applicable to other motive purposes." " Instead of employing a " rigid traction tube, and a series of short flaps to cover the longitudinal valve in the tube, and sealing these flaps with a mixture " of wax and tallow " after every passage of a train, " a tube " is used, " which is to a certain extent yielding or resilient, and " fitted on the inner faces of the longitudinal slit with lip or valve " pieces of the same length as the tube itself, so that the longitudinal slit is closed before and after each passage of the train " by the action of the tube and lip pieces themselves." Also " as " another substitute for the rigid tube valve or valves a yielding " or resilient tube " is used, " made in two parts, which are united " by rivets at the bottom, and these parts terminate at the top in " upright projections of unequal lengths, which on being brought " together form a cup-shaped valve. On their inner faces these

" projections are covered with sulphurized caoutchouc, sulphurized " gutta percha, leather, or other flexible substance, and the" cup-shaped valve "is filled to near the top with a soft substance or " composition, the melting point of which is above the ordinary " temperature of the atmosphere," which "keeps the valve at all " times equally closed, except when the connecting rod is passing " through," and several other modifications of the same principle. Also, "instead of the traction tube being fixed and the piston " being moveable, as usual, the traction tube may be moveable " and the piston stationary."

[Printed, 5*s*. Drawings. See Mechanics' Magazine, vol. 45, pp. 49 and 108; Artizan, vol. 3, pp. 52, 182, and 214; Engineers' and Architects' Journal, vol. 11, p. 341. Rolls Chapel.]

A.D. 1845, June 25.—N° 10,735.

ZAMBAUX, JOSEPH.—"Improvements in atmospheric rail-" ways," by " employing an additional tube placed along the line " of railway, the air from which tube is exhausted by pumps or " other convenient means; a communication is established be-" between this tube and the traction tube, which communication " is regulated by valves, by which arrangement the movement of " a train may be easily controlled in either direction;" also by " arranging certain valves and apparatus of atmospheric railways; " by using the travelling carriage for opening the valves" and by " a mode of constructing the longitudinal valve of three pieces of " leather or other similar flexible material stitched together in the " form of a conical section; it closes hermetically the longitudinal " slit in the tube, that being of a similar form. Between the " pieces of leather are placed wires or other non-elastic material to " prevent them from stretching."

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 257. Rolls Chapel.]

A.D. 1845, June 25.—N° 10,736.

WARD, WILLIAM SYKES.—"Improvements in exhausting air " from tubes or vessels, for the purpose of working atmospheric " railways, and for other purposes." " One of the improvements " relates to the arranging and working of the valves of air pumps " for the purpose of exhausting the air from the traction tubes of " atmospheric railways, so that the power required for opening

" and shutting the valves is supplied by gearing from the engine " or other source of power by which the air pump is actuated, so " that the inlet valves are opened and shut alternately almost " immediately after the commencement of the stroke of the piston " of the pump, and the outlet valves are respectively closed at the " conclusion of the stroke of the piston;" and "another of the " improvements consists in the combination of large vessels or " reservoirs with air pumps, so that such vessels, having been " previously exhausted, shall assist the pumps in the exhaustion " of the traction tube."

[Printed, 1*s*. 6*d*. Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 65; Mechanics' Magazine, vol. 44, p. 10; Engineers' and Architects' Journal, vol. 9, p. 91. Rolls Chapel.]

A.D. 1845, July 3.—N° 10,749.

HOPKINS, John.—" Certain improvements in rails and trams " for railways and tramways." " The object is to apply wood in " such a manner as to constitute a rail or tram or continuous " wooden surface on which the peripheries of the wheels of engines " and carriages may travel. The peculiar shapes of the rails are " intended to prevent the wheels of the carriages travelling " thereon from running off the same. The advantages arising " from such an application are increased tractional power and " greater ease to travellers."

[Printed, 6*d*. Drawings. See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 20; Mechanics' Magazine, vol. 44, p. 110; Engineers' and Architects' Journal, vol. 9, p. 92. Rolls Chapel.]

A.D. 1845, July 3.—N° 10,753.

NEWTON, William.—(*A communication.*)—" Certain improve- " ments in railways, and in the means of propelling carriages." " An improved mode of propelling carriages upon ordinary rail- " ways, whereby the steam that is generated in the boiler is made " to act in a more beneficial manner than when pistons and " cylinders are employed, and consists in causing a jet of steam or " compressed air to rush out against and act upon the fans or " blades of a horizontal wheel, upon the axle of which is mounted " a roller or rollers, which acts or bears against the side of an " additional rail, placed midway between the two travelling rails," and which, "by bearing with force against the side of the "centre rail will be found amply sufficient to move the train "forward."

[Printed, 1*s.* 10*d.* Drawings. Rolls Chapel.]

A.D. 1845, July 21.—N° 10,779.

BRETT, JACOB. — (*A communication.*) — "Improvements in "atmospheric propulsion, and in the manufacture of tubes for "atmospheric railways and other purposes;" "in this apparatus "the locomotive force is produced by fixed engines, serving to "compress air or to produce a vacuum in a main or tube placed "in or upon the ground the whole length of the road or way. "From this immense main or reservoir, the force is supplied to "great distances, to be applied, when requisite, for the transport of "trains of carriages, &c. It is by means of this reservoir main "and its embranchments that an articulated tube or tubes, which "are attached to the trains, are put in communication with the "interior of the main; and the compressed air which presses into "the said articulated tube causes the impulsion of the locomotive "and train attached to it. On each side of this main are em- "branchments, fixed in such a manner as to distribute, when "required, the compressed air at such time as the trains are to be "put in motion. This result is obtained by uniting to said em- "branchments fittings upon which are fixed hollow pistons. The "locomotive force acts by impulsion, and to obtain the entire use "of it, a kind of discharging trigger" is applied "to the locomo- "tive apparatus."

[Printed, 6*s.* 6*d.* Drawings. Rolls Chapel.]

A.D. 1845, July 31.—N° 10,794.

QUICK, JOSEPH, and **AUSTIN,** HENRY.—"Improvements in "the construction and working of atmospheric railways." "In "the method of obtaining a close joint or valve at the opening of "the tube necessary for the passage of the arm connecting the "carriage and the piston. To effect this, advantage" is taken "of the pressure of the external air upon the surface of the tube "to force into close contact the two sides of the valve, so as to "make them air-tight. The tubes are formed of two or more "parts of sufficiently thick material of suitable kind as to be

" rigid of themselves, and unaffected under the external pressure " of the atmosphere, but joined to each other with an elastic or " pliant material, or bolted together," or may be made flat at the bottom and having curved sides. " After the tube has been " opened to allow of the passage of the connecting arm, the weight " of the segments of tube will cause them to close the valve, and " the pressure of the atmosphere upon the external surface of the " tube when the vacuum is formed within, will force the sides " closely together."

[Printed, 1*s.* 2*d.* Drawings. Rolls Chapel.]

A.D. 1845, August 7.—N° 10,809.

EMANUEL, Henry.—" Improvements in atmospheric railways." An arrangement " of the propelling tube, and a method of closing " the longitudinal valves, by a flexible tube filled with compressed " air, the pressure of which is exercised on this valve in the same " direction as the pressure of the atmosphere when exhaustion is " produced in the tube, so that the continuous opening is close " by a resistent body, continually kept and returned to its place, " and on which the exhaustion has no other effect than to close " it better." And improvements in the piston and other parts.

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 8 (*enlarged series*), p. 135; Patent Journal, vol. 1, p. 155; Macrory's Reports, p. 232 (*Disclaimer*). Rolls Chapel.]

A.D. 1845, October 6.—N° 10,851.

POOLE, Moses.—(*A communication.*)—" Improvements in rails " for railways."

" In so constructing the rails that the wheels of the loco- " motive engines may run on wood, and the wheels of the " carriages on metal," whereby more adhesion is given to the wheels of the locomotive than to those of the carriage. " The " metal rails are fixed by screws or other convenient means to " the top inner angles of the wooden rails, and if guide wheels " are used in place of flanches to the wheel for guiding the " locomotives or carriages on their rails, such guide wheels may " come in contact with the metal rails."

[Printed, 6*d.* Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 270; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 240; Engineers' and Architects' Journal, vol. 9, p. 185. Rolls Chapel.]

A.D. 1845, October 6.—N° 10,854.

CRAMPTON, Thomas Russell.—" Improvements in locomo- " tive engines and railways." " In placing a wooden rail outside " of " and somewhat higher than " the ordinary iron rails on rail- " ways, on which wooden rail the driving wheel of the locomo- " tive is intended to run at the same time the other wheels " revolve on the iron rail. By this arrangement the great " adhesive qualities of wood are insured, while the disadvantages " arising from the increased traction, resulting from the whole " of the wheels moving upon wood, is obviated. Also in the " combination of an upright tubular boiler with tender, having " outside cylinders in one frame."

[Printed, 6*d.* Drawings. See Repertory of Arts, vol. 8 (*enlarged series*), p. 17; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 241; Engineers' and Architects' Journal, vol. 9, p. 220. Rolls Chapel.]

A.D. 1845, October 10.—N° 10,873.

HARLOW, Frederick.—" Improvements in atmospheric rail- " ways." " And consists of improvements in constructing and " applying the longitudinal valves," and " pistons of atmospheric " railways. The peculiarity of the valve is that it is a sliding valve " made up of pieces so connected as to be air-tight at the junc- " tions, and yet allow of movement to the separate parts, in order " to allow " of the passage of the " connecting bar. The improvements in the piston are in " so arranging the parts " of it " that " it may be used first in one direction and then in the other."

[Printed, 1*s.* 4*d.* Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 321; Artizan, vol. 6, p. 148. Rolls Chapel.]

A.D. 1845, October 16.—N° 10,882.

REED, Stephen.—" Certain improvements in railway rails & " chairs." " In constructing railway chairs and rails, by casting " said chair and rail together, and of one entire piece of metal, or " by casting the chair separately, whereby it affords an extended " bearing surface and support to the rail, and the rails thus laid " are not liable to bend, break, or spring up at the ends thereof, " or to open or be drawn asunder at their ends." Also in " the " application of a projecting piece or pin affixed to and under- " neath the said rails, and near the ends thereof, and being

" inserted into square or oblong holes formed in the base or " footings of the said chairs." Also in "connecting the several " lengths of rails by notching the rails at their ends vertically " from the upper surface thereof to the bottom, which mode of " securing the rails is intended to prevent their separating or " springing up, as also lateral movement of the rails more than " is necessary for the due expansion and contraction of the " metal." Also a method "for effecting the necessary adjust- " ment of two lines of rails to the required gauge or distance " asunder, and by which they are securely retained in that posi- " tion. Also the supporting and connecting together of rails " in single or double lines by constructing two chairs of one and " the same entire piece of metal."

[Printed, 1*s*. 4*d*. Drawings. See Artizan, vol. 10, p. 170. Rolls Chapel.]

A.D. 1845, October 23.—N° 10,890.

ORSI, Joseph.—"Improvements in sleepers and blocks for sup- " porting rails of railways." "In constructing the sleepers of bars " or rods of metal, which are passed through the under part of the " railway chairs, and are imbedded in cement, so as to form blocks " having broad surfaces at bottom, and also a peculiar construction " of chair for embracing or holding the bars or rods. In imbedding " in cement blocks of wood braced by transverse tension rods, so " as to form sleepers upon which ordinary chairs for railways may " be fixed by bolts, screws, or nails. In fixing chairs for railways " in blocks of cement to form sleepers, by imbedding projections " or wings at the lower parts of such chairs in the plastic material " and connecting two such blocks or sleepers together by trans- " verse rods attached to the metal chairs. And in constructing " longitudinal sleepers for railways by means of stout planks of " wood combined with iron bars or rods placed side by side, and " imbedded in cement, so as to form a continuous block, upon " which the rails of railways may be fastened down without " employing chairs."

[Printed, 8*d*. Drawings. See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 389. Petty Bag; *with Memorandum of Alteration.*]

A.D. 1845, October 31.—N° 10,901.

BRANDLING, Robert William.—" Improvements in railways " and railway carriages." " In a mode of keeping the wheels

" of railway carriages constantly upon the rails, by the appli-
" cation of counteracting pressures in opposite directions, and
" by means that do not cause any violent shock, in resisting
" any deviation from that position of the train where the weight
" is equally distributed on the two rails; in constructing a
" machine by which the railway trains are firmly attached to or
" easily liberated from the rope which draws them; in causing
" the trains to pass upon the surface without any obstruction
" to the usual traffic along the public highways; in confining
" the machine and rope below the surface, and in a new
" mode of communicating the tractive power to ropes used on
" railways."

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 341; Patent Journal, vol. 1, p. 46; Engineers' and Architects' Journal, vol. 9, p. 186. Rolls Chapel.]

A.D. 1845, October 31.—N° 10,902.

COLLINS, Charles Henry.—" Improvements in atmospheric
" railways." "The main or traction pipe is laid between the rails
" in the usual manner, and in place of a continuous longitudinal
" valve being made along the top, as is ordinarily the case, it is
" furnished with a series of longitudinal slots, alternate equal
" portions of the pipe being slotted and left whole, and the
" slotted portions are covered by a box placed bottom upwards
" and bolted air-tight to the top of the pipe, such box termi-
" nating at each end both internally and external, in an incline
" or slope, which brings it gradually down to the inside and out-
" side of the pipe respectively. The manner of preventing the
" passage of the air through the box during the passage of the
" piston," is as follows:—" Two pistons are mounted on the same
" shaft, one behind the other, a short distance apart. These
" single pistons are formed of cup leathers in the usual way.
" Between the pistons is a hollow cylinder of nearly the diameter
" of the pipe, and having a slot cut out of the same throughout
" its whole length, of the same width as and immediately below
" the opening into the box to allow a spring to pass up into the
" box for the purpose of closing it. On either side of the slot
" so cut out of the cylinder, a slip of leather, which reaches
" from one cup leather to the other, is rivetted, and prevents
" the passage of any air between the side of the cylinder and

" the traction pipe and the spring, by rising up and bearing " against the upper side of this box prevents the air from " passing through the box to the front of the piston; also the " use of pins, studs, grips, pincers, or other equivalent parts " attached to or connected with the piston and carriage, and " causing the same to lay hold of a driving rod, for the purpose of establishing a connection between the piston inside the " tube and the carriage outside."

[Printed, 1*s.* 8*d.* Drawings. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 1; Patent Journal, vol. 1, p. 147. Petty Bag.]

A.D. 1845, October 31.—N° 10,905.

FORSYTH, THOMAS.—" Certain improvements in signals, or in " the method of giving signals, which are applicable to the working on railways, and which are also applicable to maritime purposes, and for certain other improvements in the working of " railways." " The giving and receiving of signals made by " numbers of lights, so arranged as to be the same in figure and " number upon the train to be signalled to, and upon the station " signal apparatus," and all the engine drivers " require to know " regarding signals is, what number and figure of lights is their " own engine carrying, and that when they see a similar number " and figure of lights they are to understand thereby that their " train is desired to stop at the station where the similar signal is " given from;" also, " the application of wind guards to the " wheels " of railway engines, carriages, and waggons, " the application of catches or of other convenient means to spring buffers, " so as to prevent their recoil when necessary; the application of " an universal joint or of universal joints, for the purpose of " allowing the axles to converge to one common centre, and also " for allowing any one wheel to change its level independent of " the levels of the other wheels of the series, and the application " of many curved plates for the sides, roof, &c., of the fire-box of " railway locomotive engines, for the purpose of increasing the " area of the heating surface in them." And in a " portable crossing," " one variety of which is made by fastening two strong " flat ropes on to a piece of broad cloth, so as to become when " laid upon the ground a temporary rope tramway, over which a " train may pass from one permanent line of rails to the other;

"another variety may be made of chain laid upon timber, or in "different methods, which will suggest themselves to persons "conversant with railway working."

[Printed, 1*s*. 10*d*. Drawings. Rolls Chapel.]

A.D. 1845, November 11.—N° 10,932.

DONKIN, Bryan. — "Certain improvements on wheels as "applicable to railway carriages, and on the mechanical con-"trivances by which railway carriages are made to cross from one "line of rails on to another line, or on to what are generally "called sidings." "In providing the foremost carriage of each "train with suitable parts, which, whilst that carriage is moving "along one main line of rails, can at pleasure be let down into "such a position, as that some one of the said parts will after-"wards, by continuance of the motion of the carriage, be brought "into contact with a suitable long lever, so as to exert a very "oblique action thereon for moving the same laterally, in order "thereby to move suitable double switches of ordinary construc-"tion, with which it is connected, so that such switch rails will "become properly set in due time for conducting the carriage "from the main line of rails on to another line or into a siding," and in "giving the requisite motions to double switch rails "by action derived from a weight suspended by a cord kept "wound up around a roller, so as to exert a continual tendency "to turn it round, and in so doing, by means of a cam on the "axis of the roller, to raise up a loaded lever, which is connected "with the double switch rails in the manner of a reacting weight "thereto, which moves those rails into correspondence with the "rails of the siding."

[Printed, 2*s*. 2*d*. Drawings. Petty Bag.]

A.D. 1845, November 18.—N° 10,949.

WARD, Frederick Oldfield, and HILLES, Malcolm William.—"Improvements in the construction of railways, and "in machinery and apparatus for working carriages thereon." "A mode of arranging machinery or apparatus for working rail-"ways by means of steam caused to act on a piston moving in a "tube fixed along the length of the railway, the steam employed "being generated in a boiler carriage moving along the railway;"

and also "a mode of making rails for railways, by combining "wrought and cast iron."

[Printed, 2*s.* 8*d.* Drawings. Rolls Chapel.]

A.D. 1845, November 18.—N° 10,954.

WILSON, Edward Brown.—(*A communication.*)—"Improved "apparatus applicable to swivel bridges and turntables."

[No Specification enrolled.]

A.D. 1845, December 6.—N° 10,982.

JOHNSON, John Robert.—"Improvements in the materials "employed in constructing and working atmospheric railways." "In a new composition for sealing the valve and closing the "joints of the traction tubes of certain descriptions of atmospheric "railways," viz., "palm oil, one part; brown resin, two parts; "and china clay in fine powder, four parts; or by mixing in "various proportions the insoluble soaps, prepared by combining "fats with an oxide or earth with oily or resinous substances," and "in a new material for lining or lubricating the interior of "the traction tubes of atmospheric railways, viz., resin, seven "parts; stearine, four parts; tallow, four parts; clay, 12 parts;" and also "in an economical substitute for the leather used for "the longitudinal valve of atmospheric railways; for this purpose "a fabric is woven or felted in the form of a strap, of the proper "breadth and thickness to form the valve, and made impervious "to air and moisture, and in other respects fit for its purpose by "impregnating its fibres with and cementing them together by a "varnish, of such a nature that when dried it shall be unacted "upon by oil or fats, and possess sufficient elasticity to bear "the bend to which it is subjected in use;" and also in "con-"structing the traction and connection pipes of atmospheric rail-"ways of calcareous cements, such as Roman cement, Keene's "cement, and the like, which possess such properties as allow "them to be cast into form and do not require burning. The "cement is mixed with sand or fine gravel and water," and "rammed into moulds of proper form for the pipes, as in forming "columns and other articles."

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 8 (*enlarged series*), p. 208; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 394; Patent Journal, vol. 1, p. 99; Engineers' and Architects' Journal, vol. 9, p. 247. Rolls Chapel.]

A.D. 1846, January 3.—N° 11,024.

SWINBURNE, Thomas.—"Improvements in railways, and in "the means of propelling and carrying thereon." "The employment in atmospheric railways of short and discontinuous traction "or propelling tubes placed at intervals more or less apart. The "application of the propulsive power obtained by the exhaustion "of such short tubes to the propelling of carriages. A means of "packing the pistons of atmospheric railway tubes" and a "mode of preserving the vacuum when once obtained in such "short tubes."

[Printed, 10*d*. Drawings. See Mechanics' Magazine, vol. 14, p. 193; Patent Journal, vol. 1, p. 292. Rolls Chapel.]

A.D. 1846, January 6.—N° 11,026.

GREENHOW, Conrad Haverkam.—"Improvements in the "construction of railways and railway carriages." "A convex "rail and a peculiar formation of a concave wheel tyre, combined "with inclined spokes, whereby in the event of one rail sinking "below the level of the other, the tyre of the sunken wheel will "bear on the rail with an increased diameter, so as to compensate "in surface motion for the depression, and from the peculiar "concave shape the wheel and the rail will maintain a correct "adjustment in respect to each other."

[Printed, 1*s*. 4*d*. Drawings. See Repertory of Arts, vol. 8 (*enlarged series*), p. 73; Patent Journal, vol. 1, p. 146; Engineers' and Architects' Journal, vol. 9, p. 285. Rolls Chapel.]

A.D. 1846, January 22.—N° 11,056.

WHEELER, Charles.—"Certain improvements in the con- "struction and working of railways." A rail with "three edges "or surfaces, capable of being used as bearing surfaces for the "wheels of carriages to run upon, each of which surfaces may be "placed upwards in succession as those previously in use become "worn or injured; a cast-iron holding bracket is bolted to the "sleeper, a piece of felt or other material being interposed be- "tween the sleeper and the rail; or the bracket may be formed "with a recess on the under side in which a wedge may be in- "serted. A mode of constructing and working railways by means "of a piston, acted upon by atmospheric pressure, and traversing "in a main pipe having no communication with the atmospheric

" air, except at its extreme end behind the piston." And an " horizontal sliding valve in combination with a wedge-shaped " carriage, by which it is opened, and the springs for closing the " same."

[Printed, 10*d.* Drawings. See Mechanics' Magazine, vol. 45, pp. 135, 275, and 372; Patent Journal, vol. 1, p. 183; Engineers' and Architects' Journal, vol. 9, p. 252. Rolls Chapel.]

A.D. 1846, January 31.—N° 11,068.

ETIENNE, André.— " Improvements in the construction of " railways, railway carriages, and in the means of preventing " accidents on railways." " To avoid the unevenness of the " joints of the rails, and to render them more solid and firm, and " particularly to prevent their lateral movement. The two ex- " tremities of two rails " are formed " in the shape of a hook, in " such a manner as to join them by a bolt, so as not to make any " hole through the main part of the rail. An iron rod or bar " is laid across the line " from one rail to the other," with a fork at each end in such " manner that the extremities of the " four branches of the forks may be connected by each end, two " by two, to the two extremities of the two rails, each entering " into the hook made to the end of the rail, and being held by " the same bolt which fastens the rails." Also " another improve- " ment in railways, which consists in using a single rail only. " The rails will be of different shapes, and may be constructed of " wood plated with iron."

[Printed, 2*s.* 2*d.* Drawings. See Patent Journal, vol. 1, p. 214. Rolls Chapel.]

A.D. 1846, January 31.—N° 11,069.

PILBROW, James.—" Certain improvements in propelling on " land and water." " By forming two racks in such manner that " they shall lay hold of each other, so that the one being forced " onward the other must go with it. The tube is made with a " square channel along its upper side, but at every twenty or " thirty feet, or thereabouts, the top part of the channel is cut " away for about three feet, and partially filled up on each side " by metal, leaving the space or slit still preserved. Over this " opening a flap or cover " is placed, made " of metal, of a curved " form, corresponding with that of the raised part which works

" upon hinges, and forms a valve to exclude the atmosphere when
" shut down. The piston rack is formed of a triple series of flat
" metal links, rivetted together in the manner of a watch chain,
" so that the linked part shall present a series of holes or interstices for the reception of a set of teeth or cogs attached to
" the rack or coulter of the carriage."

[Printed, 10*d*. Drawings. See Mechanics' Magazine, vol. 45, p. 169; and vol 48, p. 213; Patent Journal, vol. 1, pp. 68. and 194; and vol. 4, pp. 237 and 356; Artizan, vol. 4, p. 3. Rolls Chapel.]

A.D. 1846, February 11.—N° 11,077.

CLARKE, Thomas, FREEMAN, Mark, and VARLEY, John.
—" Certain improvements in obtaining and applying motive
" power, parts of which are applicable to the regulating and con-
" trolling of fluids." " In an improved method of securing and
" supporting the traction tube in atmospheric railways of the sort
" known as 'the resilient.' " Standards " are " placed about six
" feet apart, which consist of curved arms bolted at the top to
" the back of the valve pieces of the tube, and secured at the
" bottom to a cast-iron saddle. One of the arms is curved to
" about a quarter of the circumference of the tube, and then
" bolted firmly to the cast-iron saddle, the other is curved half
" round the tube, and vibrates on a strong pin fixed in the
" saddle immediately under the centre of the tube. The former
" arm being rigid, admits of hardly any play of the tube on the
" side to which it is attached, but the latter arm opens and shuts
" the other half of the tube according as it is acted upon by a
" horizontal lever, which supports at its outer end a longitudinal
" rail, which runs continuously alongside the main traction tube,"
which, " being depressed by a wheel attached to the carriage
" train, and the vibrating half of the traction tube pulled back, to
" allow the connecting rod to pass through between the valve
" pieces. As soon as the wheel has passed, and the rail is
" released from the insistent pressure upon it, the levers and rods,
" and the resilient arms are also released, and the half of the tube
" to which they are attached springs back to its assigned position
" and closes the tube." Also an " improved description of piston.
" A circular recess is formed in the piston behind the segments,
" and into this recess a tube made of india-rubber, gutta percha,
" or some other waterproof substance is introduced, and is kept

" filled with water under pressure by means of a small vessel
" behind the piston containing compressed air, and having a
" direct communication with the tubular packing."

[Printed, 7*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 45, pp. 217 and 252; Artizan, vol. 6, p. 214; Engineers' and Architects' Journal, vol. 10, p. 91. Rolls Chapel.]

A.D. 1846, February 19.—N° 11,099.

NESBIT, ROBERT. — " Certain improvements in locomotive
" engines and railways." In making such additions to locomotive
" engines and railways that an engine may be propelled up
" an inclined plane without interruption, and at considerable
" velocities, or be correspondingly retarded in its descent down
" such planes, as follows :—A ring or circle of strong teeth is
" fixed to each or to one only of the sides of each of the two
" driving wheels of the locomotive engine," which " teeth are to
" take into the teeth of racks or rack bars laid down along the
" sides of each line of rails wherever there is an ascending
" gradient."

[Printed 10*d*. Drawings. See Mechanics' Magazine, vol. 45, p. 554; Patent Journal, vol. 1, p. 230; Engineers' and Architects' Journal, vol. 9, p. 321. Rolls Chapel.]

A.D. 1846, March 11.—N° 11,129.

BOVILL, GEORGE HINTON, and GRIFFITHS, ROBERT.—
" Improvements in apparatus applicable to the working of atmo-
" spheric and other railways, canals, and mines; and improve-
" ments in transmitting gas for the purpose of lighting railways
" and other places." In " using the pressure of the atmosphere
" expansively, when employed as a motive power, in working
" atmospheric apparatus used in railways and canals, so as to
" obviate the loss of power and time that occurs in exhausting
" the vacuum tubes before starting the load, and in drawing or
" propelling trains on atmospheric or other railways, and towing
" or propelling boats on canals by means of small stationary
" pneumatic, steam, or hydraulic engines, or waterwheels placed
" at convenient distances, and driving pulleys or traction rollers,
" which, when set in motion, acting by their friction upon a long
" draw bar or compound draw bar attached to the railway train
" or canal boat, to propel the same."

[Printed, 2*s*. Drawings. See Patent Journal, vol. 1, p. 273. Rolls Chapel.]

A.D. 1846, March 11.—Nº 11,134.

AUSTIN, HENRY, and QUICK, JOSEPH.—" Improvements in " the construction of railways, and railway carriages and con- " veyances ;" " and in the laying and arrangement of the rails of " the two guages, called the broad and narrow guages at the " meetings thereof, and at the crossings, sidings, and turntables " of the two guages, whereby the same railway carriages and " conveyances are enabled to travel both on the broad and narrow " guages, and to pass from one guage to the other without " stoppage, thus obviating and getting rid of the great public in- " convenience of the break of guage so generally complained of."

[Printed, 4*d*. No Drawings. See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 265 ; Patent Journal, vol. 1, p. 276. Rolls Chapel.]

A.D. 1846, March 25.—Nº 11,144.

POPE, THOMAS.—(*A communication.*)—" Improvements in appa- " ratus for moving railway carriages on to railways, and in " machinery for lifting and moving heavy bodies." In arranging apparatus which may be " carried conveniently with every train of " carriages, so that should any one of the carriages run off or " become inefficient, such carriage or carriages may be readily " moved on to or off the line as required."

[Printed, 4*s*. 6*d*. Drawings. See Repertory of Arts, vol. 8 (*enlarged series*), p. 272 ; Patent Journal, vol. 1, p. 405 ; Engineers' and Architects' Journal, vol. 9, p. 383. Rolls Chapel.]

A.D. 1846, March 25.—Nº 11,151.

TAYLER, JOSEPH NEEDHAM.—" Certain improvements in pro- " pelling vessels ; and also certain improvements in constructing " vessels so as to be used in combination with certain machinery " or apparatus for removing sand banks and other obstructions " to navigation ; part or parts of which machinery or apparatus " may be used on railways, or may be adapted and applied to " carriages on common roads." The patentee " claims the " adaptation and application of part or parts of such machinery " or apparatus to carriages, either on railways or common roads, " consisting of the carriage with a double frame and elastic bed " between, consisting also (for railways only) of the heavy luggage " carriage, with a toothed drag, to be brought into connection " with the ground between the rails through the intervention of

" an additional central buffer, whether by self-acting means, or " by the agency of the guard, and also the simultaneous dis" engagement of the carriage."

[Printed, 1*s.* 8*d.* Drawings. Petty Bag.]

A.D. 1846, April 28.—N° 11,184.

BERQUE, Charles de.—" Improvements in atmospheric rail" ways." " In constructing and closing the longitudinal openings " in the traction tubes, and in the machinery connected there" with." An " arrangement for supporting the piston by means " of a framing and wheels," and " the application of vulcanized " or other suitably prepared india-rubber in the construction of " valves for the traction tubes of atmospheric railways, in such " manner that the edge or edges of the india-rubber may be " curled or bent against the sides of the openings of such tubes, " so as" to close them.

[Printed, 10*d.* Drawings. See Patent Journal, vol. 1, p. 421. Rolls Chapel.]

A.D. 1846, May 5.—N° 11,197.

CHURCH, William.—" Certain improvement in machinery to " be used in making tubes or tubular articles, applicable to " various purposes." A machine for flattening and straightening bars and rods of " metal, rails for railways, &c.," and also a machine for bending bars of flat iron " up into the form of a tube, " suitable for a rail to conduct railway carriages " upon.

[Printed, 4*s.* 6*d.* Drawings. See Patent Journal, vol. 2, p. 717. Petty Bag.]

A.D. 1846, May 22.—N° 11,216.

GREAVES, Hugh. — " Improvements in the construction of " railways, and in the carriages to be used thereon." " In a " surface packed sleeper, which is formed of a hollow trough, " having an opening at or near its top, through which it can be " packed or adjusted, so as to raise or depress it to a line with " the sleepers on each side of it, whereby the permanent way may " be maintained in working order at less cost than at present. " Also, an improved chair in connection with a tension rod, to " be used at the joints of the rails, which chair may be cast on " the trough sleeper, and form a part of it, or be separately cast

" and used with the tension rod on trough sleepers, or on ordinary " sleepers, whereby the parallelism of the rails forming one road- " way is better retained, and greater strength is imparted to the " roadway. And in constructing a railway locomotive engine " with two cylinders on each of its sides fixed to the outside of " the framing, in order that the engine may have two pairs of " driven wheels."

[Printed, 3*s.* 6*d.* Drawings. See Patent Journal, vol. 2, p. 525; Practical Mechanics' Journal, vol. 4, p. 84; Artizan, vol. 9, p. 147. Rolls Chapel.]

A.D. 1846, May 26.—N° 11,222.

COWPER, EDWARD ALFRED.—" Improvements in the manu- " facture of railway chairs." " Forming moulds for making " railway chairs, such moulds consisting partly of sand and partly " of metal chill plates, the metal chill plates being introduced into " the patterns before making moulds (by remaining in the sand), " and such chill plates being allowed to retain their positions in " the sand after the patterns are withdrawn, and until the chairs " are formed by the melted metal."

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 9 (*enlarged series*), p. 142; Patent Journal, vol. 2, p. 498. Rolls Chapel.]

A.D. 1846, June 4.—N° 11,237.

ROBERTSON, JOSEPH CLINTON.—(*A communication.*)—" Cer- " tain improvements in railways and railway carriages." " In " arrangements by which the probability of accidents from the " breaking of the axles of the wheels of the carriages, or from " the carriages running off the line, is greatly diminished. By " keeping the carriages in such a position that they may not " materially deviate from the position on the railroad which " they are intended to occupy." There is placed " in the centre " of each line of railway a centre rail much more elevated " than the two side rails; and attached to the bottom of each of " the carriages" there are " one, two, or more triple sets of " rollers, one of which is placed horizontally so as to come in " contact with and run on the top of the centre rail in the event " of an axle breaking, while the other two rollers are placed " vertically one on each side of the centre rail, to prevent the " carriage from swerving to either side. These rollers run always

" free of the centre rail except when an accident occurs, or the " making of a sharp curve brings them into action. The number " of sets attached to each carriage varies with the length of such " carriage."

[Printed, 10*d.* Drawings. See Mechanics' Magazine, vol. 46, p. 483; Patent Journal, vol. 2, p. 490. Rolls Chapel.]

A.D. 1846, June 29.—N° 11,274.

PARKIN, Thomas.—" Improvements in the means of giving " motion to locomotive carriages, with or without bearing wheels " attached to them, and in the construction of ways, passages, " and roads on which the said carriages are to travel." " In the " system of locomotion for conveying passengers, goods, and " other articles on platforms, with or without carriages erected " thereon, such platforms gliding on the peripheries of friction " wheels mounted in parrallel lines on metal, wooden, or other " supports; in applying the same system in part to existing " railroads; and in the construction of viaducts and wooden " framework for supports in reference to locomotion, and in preparing and laying the foundation on which the same shall be " built or placed."

[Printed, 1*s.* 2*d.* Drawings. See Patent Journal, vol. 2, p. 538. Rolls Chapel.]

A.D. 1846, July 14.—N° 11,295.

BROWN, Sir Samuel.—" Improvements in railways and carriages to run on railways." " Improved carriages mounted " between two pair of five-feet wheels, plain wheels without " flanges, adapted to run on wood rails. There is in this case a " centre rail with deep centre groove wheels on separate axles. " These centre groove wheels may either be used also as guide " wheels to prevent the bearing wheels from diverging on the " rail, or they may be adjusted to relieve the bearing wheels of a " portion of the weight."

[Printed, 1*s.* 4*d.* Drawings. Rolls Chapel.]

A.D. 1846, July 30.—N° 11,318.

MALLET, Robert, and DAWSON, John Somers.—" Certain " improvements in railway carriages and in machinery for working " railways, parts of which are applicable to other carriages and

" the bearings of other machinery." "An improved turn-table " for shifting railway engines or carriages from one line of rails to " another. The principal objects aimed at are, first, to make the " principal parts of the table adjustable independantly of the " masonry to which it is secured; second, that the centre of " gravity of the whole moveable structure shall be kept as much " as possible below the point of support upon which it revolves; " third, that the table shall be capable of support at the edge or " periphery at any point of its revolution, and that this support " may be promptly applied or withdrawn; and, fourth, that the " friction and resistance to motion shall be reduced to the utmost " possible degree consistent with strength and rigidity.

[Printed, 2*s*. 2*d*. Drawings. See Repertory of Arts, vol. 17 (*enlarged series*), p. 1; Mechanics' Magazine, vol. 46, p. 145; and vol. 47, p. 180; Practical Mechanics' Journal, vol. 2, p. 213. Rolls Chapel.]

A.D. 1846, August 11.—N° 11,330.

WARCUP, **William**.—" Certain improvements in the manu- " facture and arrangement of parts and apparatus for the construc- " tion and working of atmospheric railways." " An atmospheric " tube, divided longitudinally into two parts, whether connected " by hinges or not, and forming a complete tube for exhaustion " when closed, the longitudinal connection and joint between the " top and bottom parts of the tube being effected without having " recourse to the elasticity of the material of which the tube is " composed, or to the intervention of an elastic material to form " a hinge, or otherwise closing solely by the weight of the upper " part without the assistance of springs or other mechanical " agency." Uses " also, longitudinal ribs that form the abutment " for the top valve or upper half of pipe."

[Printed, 1*s*. 8*d*. Drawings. See Repertory of Arts, vol. 9 (*enlarged series*), p. 218; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 99; Patent Journal, vol. 2, p. 634; Engineers' and Architects' Journal, vol. 10, p. 90. Rolls Chapel.]

A.D. 1846, August 30.—N° 11,361.

HENSON, **Henry**.—" Certain improvements in railways and " railway carriages." " To facilitate and expedite the transfer of " goods and passenger carriages and trucks from one line of rail " on to another of a narrower or wider guage. A truck with a " distance between the wheels suitable for the ordinary broad

" guage of seven feet, two iron rails are fixed upon the upper " side of this truck, the distance between which exactly corre- " sponds with the width of the rails of the narrow guage. The " relative positions of the two lines of railway at their junction is " such that if continued they would run parallel the one with the " other, the narrow being within the broad; but there is a dif- " ference of level equal to the height of the surface of the rails on " the truck above the surface of the rails of the line on which the " truck is intended to run, so that when the truck is brought " into position it may, without any trouble of lifting, be at once " run upon it," Also, "an improved form or construction of rails " to be used on railways, either made of malleable iron rolled in " the usual manner, or of cast iron chilled." There is "a cill or " longitudinal sleeper which runs the whole length of the line of " rails," and upon this a "triangular sleeper of wood is laid and " bedded, either upon felt or some other like elastic material. An " angular recess" in the rail "fits to and rests upon the triangular " sleeper, and the rail is secured" by bolts "to the sleeper. The " heads of these bolts should be made of some peculiar form " which a wrench or key of a corresponding form only will open, " so that persons only who are provided with such wrench or key " can be able to unscrew them."

[Printed, 2*s*. 4*d*. Drawings. See Mechanics' Magazine, vol. 46, pp. 241 and 350. Rolls Chapel.]

A.D. 1846, October 2.—N° 11,388.

POUILLET, Charles Marie.—" Improvements in railways." " In the forming a trench the whole length of the lines of railway, " into which concrete or ballast is placed, and in arranging the " sleepers and laying them down upon a plate in such manner as " to insure their steadiness and firm position, and to enable them " to resist the shocks of the trains in passing over them; and in " chairs having interior inclined spaces so as more readily to give " the required inclination to the rails. By the introduction of " these improvements the weight and size of the sleepers, rails, " and chairs may be considerably reduced, aud the upper surface " of each part of the rail may be more easily levelled, and the " position of the sleepers more easily changed when required."

[Printed, 2*s*. 2*d*. Drawings. See Patent Journal, vol. 2, p. 766. Rolls Chapel.]

A.D. 1846, October 8.—N° 11,406.

STRUVE, William Price.—" Improvements in railway " transit." " A carriage or carriages, waggons, or anything else " which may be required to travel along the railway," is attached to a " travelling piston or partition " inside the traction tube, " and it is evident that the velocity at which the same will travel " will depend upon the size or area of the piston and the degree " of exhaustion created, as compared with the resistance of the " traction and gravitation of the carriages and piston. The ex- " haustion " is created " by means of gasometers or hollow cham- " bers moving in water, the water forming the hermetical seal, the " water being contained in tanks or vessels constructed of masonry, " brickwork, or wrought iron, or any other material, and the " chambers or gasometers of iron plates or other metal, or wood- " work, such gasometers to be enclosed in an outer chamber, so " as to form double-acting pumps, and to be supplied with inlet " and outlet valves, the gasometers or hollow chambers being " supplied with cranks, connecting rods, shafts, or other ma- " chinery to be moved up and down by means of steam engines " or water power, or any other power or mode most convenient, " thus forming large air pumps the size of the gasometer; air " pumps to be governed by the size of the tube and the velocity " required.

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 9 (*enlarged series*), p. 277; Patent Journal, vol. 2, p. 767. Rolls Chapel.]

A.D. 1846, December 14.—N° 11,485.

GALLOWAY, Elijah.—" Improvements in rotary engines and " in locomotive engines, and in railways." The " improvement " in railways consists in making the working faces of a middle " rail of steel by having thin layers of steel welded on the surfaces " on which nipping or biting wheels act. This can be done by " piling or uniting thereon bars of steel at a welding heat, or by " some one of the usual methods followed when iron is covered " with steel."

[Printed, 2*s*. Drawings. See Repertory of Arts, vol. 10 (*enlarged series*), p. 272; London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 363; Artizan, vol. 7, p. 243; Patent Journal, vol. 3, p. 74. Rolls Chapel.]

A.D. 1846, December 14.—N° 11,490.

TODD, John, and JOHNSTON, William.—" Improvements " in arranging the rails on certain parts of railways." In an " improved mode of arranging the rails in the engine or car- " riage station house, whereby any one engine and tender or " passenger or goods carriage may be removed from the station " without the necessity of deranging or moving any of the others " placed therein; and a mode of constructing switch boxes for " railways. The points or switches are connected by means of " a rod and link to a bell-crank lever, the opposite end of which " carries a weight. The switches are worked " by a hand lever " mounted on the same pin as the bell-crank lever, but moves " independent of this latter, and therefore is not so likely to be " shaken and " injured, " by the passage of the train as if fixed " on the shaft. By making the box a double switch box it will " answer the purpose of two single ones, will be less expensive, and " may be more firmly secured in its seat."

[Printed, 2*s.* 2*d.* Drawings. Petty Bag.]

A.D. 1847, January 21.—N° 11,538.

BEADON, George, and SMITH, Andrew.—" Improvements " in warping or hauling vessels, which improvements are also " applicable to moving other bodies." In hauling carriages " on " railways or tramways by means of ropes, chains, or bands. An " improved construction of expanding reel or whelp wheel, whether " applied to the warping of vessels upon inland or other waters, " or upon land, for moving engines and carriages upon railways, " and also the arrangement of the machinery employed in con- " nection with such whelp wheel or reel for guiding the warping " rope or chain on to the reel, and making it 'taut' upon the " whelps thereof." Also a " modification whereby the nip is " given to the warping rope, or to hoop iron used as a warp, by " means of friction rollers."

[Printed, 2*s.* 8*d.* Drawings. See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 157; Patent Journal, vol. 3, p. 238; Engineers' and Architects' Journal, vol. 10, p. 291. Petty Bag.]

A.D. 1847, February 12.—N° 11,577.

HEDGE, Egbert.—" Improvements in rails for railways, and in " the manner of securing them." " The rail is formed with an

" upper and lower table connected together by a rib, the upper
" table being made with projecting shoulders which rest on the
" sleeper, and the lower table to be inserted in the sleeper, so that
" the rail may be firmly clamped to and secured in a continuous
" longitudinal sleeper. Rails of the form and secured as above
" described, may be made of cast iron, since, from the continuous
" support which the rail will receive, both vertically and laterally,
" from the timber, and from the manner in which it is clamped
" to or secured in the longitudinal sleepers, fractures will be
" extremely unlikely to occur, and in case of any fracture the
" road will not be deranged by the displacement of the fragments."

[Printed, 6*d*. Drawings. See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 108; Patent Journal, vol. 3, p. 338. Rolls Chapel.]

A.D. 1847, February 24.—N° 11,597.

WILD, CHARLES HEARD. — " Improvements in constructing
" parts of railways." " In the construction of switches, it is
" usual to form the moveable tongues so that their ends may be
" placed in notches formed in the fixed rails, the consequence of
" which arrangement is, that the moveable ends or points of the
" tongues must either be made very thin, or else very deep
" notches must be made in the fixed rails, both of which arrange-
" ments are objectionable. According to the first part of the
" invention, the notches in the table or upper part of the fixed
" rails are dispensed with, and the points of the tongues are so
" constructed that they may pass below, and be housed under
" the upper part of the fixed rails. The upper surface of the
" improved tongue rail is also made lower than the fixed rails at
" the point, and for a considerable distance beyond. The tongue
" rail thus constructed, when in action, will act laterally against
" the flanges of the wheels for a considerable length from the
" point before the wheels come to be borne by the upper surface of
" the tongue. In the improved method of constructing moveable
" tongue rails, the upper part of the points of such rails is
" bevilled off upon both of its faces, so as to make the upper
" side of it in the form of a wedge, the thin edge being upper-
" most, and the point is kept so far below the bearing surfaces of
" the adjacent fixed rails, that for a considerable distance from
" the point the moveable tongue only acts laterally against the
" flanges of the wheel passing along the railway. No weight is

" taken by the tongue rail for a considerable space, extending " from its point to a place where it gradually rises to a level with " the adjacent rails, the tongue rail having at such places become " sufficiently strong for this purpose. Owing to the bevelling of " the upper surface, and the lowering the point of the tongue " rail, a portion of the thickness of it when brought into contact " with the adjacent fixed rail is housed under the bearing surface " of it. And so constructing the tongue rail" enables us "to " make the point thereof sufficiently strong, without having " recourse to the objectionable expedient of notching the bearing " surface of the fixed rail against which it is to be placed. " Improvements in the construction of turntables, consisting in " a mode of counterbalancing the top of the table by a lever " apparatus, and the arrangement of conical rollers, with all their " upper bearing edges in the same plane, so that, although by " the surge or lateral force of trains passing over the turntable " the top plate may be driven somewhat out of its proper position, " the top plate will still bear evenly and equally upon the rollers, " and in placing the rails across turntables, and arranging or " combining such turntables when arranged or placed diagonally " across parallel lines of railway, that when the tables are not in " action, the through line and the diagonal line of rails may at all " times be complete, so as to allow of the passing of a vehicle " across the table and along either of those lines, and save a " considerable amount of the labour necessary for transferring " vehicles from one line to another."

[Printed, 2*s*. 4*d*. Drawings. See Repertory of Arts, vol. 10 (*enlarged series*), p. 193; Patent Journal, vol. 3, p. 356; Engineers' and Architects' Journal, vol. 10, p. 320. Rolls Chapel.]

A.D. 1847, March 23.—N° 11,631.

FOX, Charles.—(*A communication.*) — " Improvements in the " permanent way of railways, and in carriages to be employed on " railways." " In constructing permanent ways with double rails " instead of single rails at each side of the way, so that the flanges " of the carriage wheels which run on the way may pass between " the double rails on each side of the carriage; and in con- " structing the switches for such double-railed ways; and in a " mode of securing railway chairs in their proper places upon " their sleepers."

[Printed, 1*s*. 2*d*. Drawings. Rolls Chapel.]

A.D. 1847, March 27.—N° 11,641.

MAY, Charles. — "Improvements in railway chairs, the "fastenings to be used therewith, and in trenails." "In manu"facturing railway chairs the mould is formed in a similar "manner to that described in the Specification of Ransome and "May's Patent, of February 1841, in which side plates of metal "are used to form part of the mould, and for guiding and "supporting the core. This part of the invention consists of "forming the core for the interior of the jaw of a chair with "sand upon a metal interior or core bar, combined with the "using of metal side plates or surfaces as part of a mould, and "as supports to the core; also of having a cross bar attached to "the flask, into which the tail end of the core projects; and "using metal cores for casting the holes for the trenails or "fastenings. Another part of the invention relates to the manu"facture of wood fastenings used with railway chairs, and of "wood trenails. In practice, such fastenings frequently become "swelled" by exposure to moisture. "It is desirable to retard "the swelling process, and this is accomplished by covering them "with any repellant of water, as varnish or grease, but it is not "intended that this shall permanently repel moisture, as they are "required to swell after driving."

[Printed, 1s. 2d. Drawings. See Repertory of Arts, vol. 10 (*enlarged series*), p. 260; Engineers' and Architects' Journal, vol. 10, p. 390. Rolls Chapel.]

A.D. 1847, March 29.—N° 11,642.

GRIESBACH, John Henry. — "Improvements in the con"struction of railways, and in engines and carriages to run "thereon." Arranging guide rails to the ordinary rails of "a "railway, and combining therewith horizontal wheels, in such "manner that railway carriages may run with more safety, and "yet be able to pass with freedom from one pair of rails to another "pair of rails without requiring flanges on the wheels." When on "a turntable, the guide rails for the horizontal wheels are "applied to the turntable as well as to the rails, so that a carriage "with unflanged wheels will be retained on the rails correctly "when being removed from one set of rails to another over the "turntable."

[Printed, 1s. 4d. Drawings. See Repertory of Arts, vol. 10 (*enlarged series*), p. 257; Patent Journal, vol. 3, p. 457. Rolls Chapel.]

A.D. 1847, April 1.—Nº 11,648.

STRATTON, Benjamin Tucker.—"Improvements in railways, " and in wheels and other parts of carriages for railways and " common roads." "In the mode of constructing the rails or " bars on which the carriages are to run, the said bars consisting " of a hollow ridge of any suitable section, with a flange extending " along each edge, and forming the base of the ridge, and the " said flanges having holes to receive the bolts by which the bars " are secured to the sleepers. The improvement consists in " attaching to the under side of the flanges a bar or plate of iron " extending from the outer edge of one flange to the outer edge " of the other, and as an additional security the bar or plate may " be turned up at the edges, so as to clip or embrace the flanches. " The tie plates may either extend the whole length of the rail " bar, or be applied in short pieces at intervals along the flanges. " The tie plates may be connected to the flanges of the rails by " bolting or rivetting, but it is considered preferable to unite the " tie plate to the rails by welding."

[Printed, 8*d.* Drawings. See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 344. Rolls Chapel.]

A.D. 1847, April 29.—Nº 11,679.

BROAD, Robert.—" Improvements in railway turntables."

[No Specification enrolled.]

A.D. 1847, April 29.—Nº 11,680.

BROOMAN, Richard Archibald. — (*A communication.*)— " Certain improvements in railway turntables." "The leading " or characteristic features of all are, that the table, when required " to be turned, is raised by the pressure of a fluid, and sustained " whilst being turned upon the fluid by the pressure of which it " was so raised, and when turned to the required position, " lowered by withdrawing that pressure, and that the table when " not required to be turned rests on continuous or solid masonry " bearings under the passing weight, instead of on a central " column, or on rollers. The operation of turning the table is as " follows :—The carriage which is to be turned and run on to " another line of rails, or reversed, having been run upon the " table, one or two strokes of the pump will raise the table from

" its bearings. The table with its load will then be sustained by " a central column or pillar resting on a fluid, and may be turned " with great facility."

[Printed, 1*s.* 4*d.* Drawings. See Mechanics' Magazine, vol. 47, p. 467; Patent Journal, vol. 4, p. 6. Rolls Chapel.]

A.D. 1847, May 6.—N° 11,694.

FOX, Charles, and HADDAN, John Coope.—"Improvements in railway chairs and switches, and in trenails or " fastenings." "An improvement in the construction of railway " chairs; it consists in making the smaller ends of the taper " holes for the reception of trenails for fastening them upon the " sleepers with the extremities or edges thereof rounded, and in " making the railway chairs with studs on the under surface to " fit into corresponding holes to be made in the sleepers upon " which they are to be placed. The object of these studs is to " prevent or diminish the lateral movement of the chairs, lessen " the strain upon the trenails, and preserve the position of the " chairs upon the sleepers. An improvement in the construction " of railway switches; it consists in a mode of constructing " the moveable tongue rail or rails of a railway switch, so that " the same shall move or act vertically instead of horizontally, " having two moveable tongue rails moving vertically, having " machinery connected with the tongue rail for the purpose of " raising and lowering it. The chairs are of a construction " generally used, except where they receive the tongue rails, " having there a portion of their seats made with inclined planes, " so as to receive and support the wedges, by means of which the " tongue rails are raised or lowered. The seats of the chairs are " made sufficiently deep to allow the tongue rail which is to be " placed within it to descend so far as to be out of the reach of the " flanges of the carriage wheels passing along the railway. The " rails, which are placed within any of the chairs, which has also " a tongue rail placed within it, must be secured to the sides of " such chairs by screw bolts. When a switch is furnished with " two tongue rails, the wedges are fixed upon the connecting bar " at one side, with their points in a direction opposite to the " direction of the points of the wedges on the other side, and " the inclined planes within the seats of the chairs are also placed " in opposite directions, and the wedges and apparatus connected

" therewith are arranged in such a manner that when the tongue " rail on one side of the line of rails shall be raised by the action " of the wedges underneath it, the wedges under the tongue rail " on the other side of the line of rails shall be drawn back, so as " to allow the tongue rail above them to descend, and so be out " of action. Also an improvement in the manufacture of trenails " or fastenings; it consists in forming such trenails or fastenings " by cutting or shaving pieces of wood into the required shapes " of the trenails by means of self-acting machinery, instead of by " the ordinary lathe, and gouges or chisels, which are moved " and held by the workman." And also "an improvement in " the preparation of railway sleepers; it consists in improved " machinery for preparing such sleepers, such machinery having " revolving cutters, and the sleepers when being prepared passing " over the top of the machinery with their faces downwards."

[Printed, 3s. Drawings. See Patent Journal, vol. 3, p. 594. Rolls Chapel.]

A.D. 1847, May 24.—N° 11,715.

ADAMS, WILLIAM BRIDGES, and RICHARDSON, ROBERT. —" Certain improvements in the construction of railways, and " of engines and carriages used thereon." " Firstly, improved " modes of securing the joints of the rails to render them more " firm and durable and prevent the dangerous 'tipping' of the " joint sleepers; for which purpose two cross sleepers " are used, " one at each side of the joint, instead of one cross sleeper directly " under the joint, and a chair is placed on each sleeper beneath " each of the two rails, or a double-headed chair is fixed to hold " the two cross sleepers in their proper position, such double " chair having separate bearings for the ends of the rails in such " mode that the joint between the two rails may be above the " opening between the sleepers, whether the double chair or the " two single chairs be used, and a single cross sleeper may be " used with the double-headed chair. And to connect the two " iron rails together wood or metal fishes are used, driven in, on " one or both sides of the rails, so as to fix them firmly between " the two rails and the chairs in such mode that the fishes will " support the rails vertically, either with or without the rails " bearing on the bottoms of the chairs; and the two rails may " abut square together or be scarfed. Also a mode of applying " double sleepers in combination with rails in two halves, formed

" of two separate bars placed vertically against each other and " secured in the chairs, such rails being applied so that each joint " of the half rail may be in lateral contact with the solid part of " the other half rail, technically understood as 'break joint.' " Another part relates to laying rails so as to enable engines and " carriages to pass very sharp curves and obviate the necessity of " using turntables for the purpose of reversing such engines and " carriages. To accomplish this object the outer rail" is broken off, "or the distance between the rails" is widened "a yard or " two beyond the commencement of the curve, and for the outer " rail a plain surface of wood, stone, or iron," is substituted, " serving as a train rail on which the peripheries of the flanges of " the outer wheels will run; this surface is raised considerably, " sloping towards the inner rail, so that the gravity of the carriage will have a tendency to keep the inner wheels on the inner " rail, and the outer wheels, running on larger diameters than " the inner, will facilitate the movement round the curve. Also " the application of steel or steeled iron bars to form the rails for " engines and carriages to run on. And another part relates to " the application of terminus buffers to receive the shocks of " trains arriving at terminal stations," such buffers "consisting " of disc or other springs in combination with air pistons, so that " violent recoil may be prevented, the air piston either fitting the " air chamber loosely to prevent the passage of air, or a hole " pierced in the air chamber, so that the air will offer elastic " resistance to the force of the shock while being driven through " the hole, and the power of the disc or other springs in the recoil " will be regulated and moderated by the slow indraught of the " air through the hole to refill the air chamber."

[Printed, 2s. 6*d*. Drawings. See Practical Mechanics' Journal, vol. 2, p. 2; vol. 3, p. 69; and vol. 4, p. 147; Artizan, vol. 7, p. 28; and vol. 9, p. 148. Rolls Chapel.]

A.D. 1847, May 27.—N° 11,718.

ALLAN, ALEXANDER.—" Certain improvements in turntables " to be employed on or in connection with railways, part or parts " of which said improvements are also applicable to the construc- " tion of tubular boilers." In "constructing the main frame of " turntables of wrought iron instead of cast," and "in having " more than one line of railways running parallel with each other "upon the same turntables;" also an "improved apparatus," called "the 'hydrostatic or floating turntables,'" which may be described as follows:—The main "frame or platform of the "turntable is immersed in a suitably constructed reservoir filled "with water or other fluid, the height of which fluid is propor-"tioned to the maximum weight intended to be conveyed across "the table, and the proper quantity of fluid, when once ascer-"tained, is rendered constant by an ordinary ball-cock or other "contrivance placed in connection with a cistern or other source "by which the reservoir is supplied."

[Printed, 1*s*. Drawings. See Patent Journal, vol. 4, p. 26. Petty Bag.]

A.D. 1847, May 27.—Nº 11,721.

THORNEYCROFT, George Benjamin.—"Improvements in "the manufacture of rails for railroads." "In making a piece of "iron to form the wearing part of the rail of one homogeneous "substance without piling or faggoting in any way, being free "from joints. To accomplish this take pig or refined metal of "the best quality, and puddle it in the most perfect manner, and "make one ball of sufficient weight to form the slab or bloom "required for the wearing part of the rail, or, if more convenient, "put two or more puddled balls together while the iron is in a "maiden state, and before any part of it has been operated upon "to make it solid or nearly approaching to solidity, so that a "perfect union may take place. Having thus got the proper "weight of iron in one perfect mass, instead of working it down "and piling and working it down again in rolls or by hammers, "the requisite ductility is obtained to the iron when it has been "compressed sufficiently to make its specific gravity about the "same as when piled and re-rolled down into what is called "Number 2 or Number 3 bars, which is what is generally used "on the outer surface of the pile or faggot of which railway bars "are generally made." To make what is called "antilaminating "rails from puddled iron, take pig or refined metal and make it "malleable in the charcoal refinery, bringing it out in one lump "of sufficient weight to make the slab or bloom which is to form "the wearing part of the rail."

[Printed, 6*d*. Drawings. See Repertory of Arts, vol. 10 (*enlarged series*), p. 345; London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 198; Patent Journal, vol. 4, p. 31. Rolls Chapel.]

A.D. 1847, June 10.—N° 11,738.

DARLING, WILLIAM.—" Improvements in moulding, and in " the manufacture of certain articles of cast iron." " Relates to " a means of producing cast iron railway chairs by the use of " moulds composed of cast iron or other metal; to an arrange- " ment of machinery or apparatus which facilitates the application " of melted iron to the moulds of railway chairs, whether such " moulds are composed of metal or other suitable material; to " the annealing of railway chairs; and to the employment of " melted iron taken directly from the smelting furnace in the " production of railway chairs."

[Printed, 10*d.* Drawings. See Mechanics' Magazine, vol. 47, p. 605; Practical Mechanics' Journal, vol. 1, p. 15; Patent Journal, vol. 4, p. 80. Rolls Chapel.]

A.D. 1847, June 12.—N° 11,741.

JOHNSON, JAMES. — " Improvements in machinery for the " manufacture of rivets, railway or other pins, bolts, nuts, and " spikes." " Arranging a carrying bar or bed with dies, and " causing the same to move step by step to the upper die or " punch; and a mode of arranging apparatus for cutting lengths " of rods for making rivets, pins, bolts, and spikes."

[Printed, 1*s.* Drawings. See Repertory of Arts, vol. 11 (*enlarged series*), p. 90; Patent Journal, vol. 4, p. 123. Rolls Chapel.]

A.D. 1847, July 20.—N° 11,809.

BURCH, WILLIAM.—" Improvements in railways, in carriages " to be used on railways, and in giving signals to railways." " The improvements consist:—Firstly, in a method of breaking " the extraordinary shocks to which railway carriages are occa- " sionally exposed; secondly, in a method of obtaining a signal " to show the time which has elapsed since the passing of a train; " thirdly, in a method of using steel as an elastic resisting power " for railway carriages."

[Printed, 1*s.* 10*d.* Drawings. Rolls Chapel.]

A.D. 1847, July 29.—N° 11,819.

BAINES, WILLIAM.—" Improvements in the manufacture of " parts of railways, and in apparatus used in constructing rail- " ways." " Improvements in the construction of railway chairs.

" These chairs are intended to hold the rail without wedges or " keys by placing the two jaws at a distance from each other in " such manner that when they are fixed the rail between the " jaws will be supported on both sides, the opening in the chairs " being so made as to be correctly filled by the rail. In placing " a chair on to a rail the chair will require to be inclined to the " line of the rail, in which position the rail may readily be passed " through the opening in a chair, or a chair be passed on to a " rail, but so soon as the chair is brought into position relatively " with the rail the rail will be securely upheld and nipped between " the two jaws of a chair. Another part relates to the construc-" tion of joint chairs for railways. This chair is formed with two " jaws, one being much higher than the other, and it has a hole " through it to receive what is called a fixing pin, the stem of " which is formed square, and the head of it forms, when fixed, " the upper part of one of the jaws. The stem of the fixing pin " has a notch in it, by which it is retained secure when the pin is " driven in, but also acts as one of the holding-down pins of the " chair. The two ends of the rails are to be notched out to admit " of the passage of the stem of the pin, by which means the " rails will be securely retained from rising above one another. " Another improvement in railway chairs for the switch rails, " having for its object the so forming the upper parts of a chair " that there shall be inclined planes for carrying off any dust or " matters which may have been liable to accumulate between the " tongue rail and the main rail and chairs." The invention also relates to " an arrangement of switch box and apparatus for " moving the tongue rails of switches of railways; and also to " combining machinery in such manner as to guage the rails and " hold them securely during the boring the sleepers for the chairs " and whilst fixing the chairs, by which the laying of rails and " fixing chairs will not only be facilitated but the work more " correctly done."

[Printed, 2*s*. 8*d*. Drawings. See Patent Journal, vol. 4, p. 289; Artizan, vol. 7, p. 161. Rolls Chapel (*with Disclaimer*).]

A.D. 1847, August 3.—N° 11,829.

YULE, John.—" Improvements in chairs used on railways, and " in the fixing of the same."

[Practical Mechanics' Journal, vol. 1, p. 14 (*notice of Scotch Specification.*) No (*English*) Specification enrolled.]

A.D. 1847, September 2.—N° 11,852.

MADIGAN, Richard. — " Certain improvements in railway " turntables." " It consists in making the parts thereof partly " of wrought iron and partly of cast iron combined together. " The apparatus consists principally of three parts; first, of an " under framework, which is stationary, second, of the table, " which is moveable round its axis, and, third, of a 'motion' or " framework for retaining in their proper places such antifriction " rollers as may be employed for enabling the upper table to be " turned readily and smoothly round with its load upon it. The " invention has also for its object the constructing of railway " turntables in such manner that while they shall be capable of " transferring carriages from one line of rail to another crossing " the same, they shall leave both the main lines of rails unbroken " and uninterrupted, instead of the main lines of rail being, as " usual, continued along the tables themselves. Another prominent advantage is, that as the table is contained within the " lines of rail, it will turn carriages on railways where tables of " the ordinary size could not be used, owing to the contiguity of " the rails, and consequent with this improved table, six-wheeled " engines and carriages may be turn with as much facility as " those with four wheels. And in constructing railway turntables " with horizontal antifriction rollers, which are attached to the " rail platform by means of pins, on which they turn easily and " roll against the curb, which is turned or bored of a cylindrical " form at that part against which the rollers work; a step is used " for the central pivot to work in, which is connected to the curb " by tie rods. The curb and step are both firmly bedded on a " suitable foundation."

[Printed, 3*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 48, pp. 289 and 313; Patent Journal, vol. 4, p. 374. Rolls Chapel.]

A.D. 1847, October 21.—N° 11,916.

SHAW, Richard. — " Improvements in the manufacture of " wrought-iron railway bars and railway chairs." " It consists of " improvements in piling iron for, and in making wrought-iron " railway bars, of manufacturing wrought-iron railway bars with " protecting rails or flanches, in such manner that the working " heads or surfaces of the rails stand above the supports of the

" protecting flanches. Of constructing railway bars with hollow " heads or working surfaces, in such manner that the cheeks of " the chairs may pass under the hollow and give support thereto. " Of rolling railway bars, and certain parts of railway bars, by " three rollers placed one above the other. And a new con- " struction of railway chairs," in which "a cheek in each chair " is suitably formed to come under and support the protecting " rails and a part of the railway bars, or the part only where such " rails are used; or the cheek is so formed as to enter into the " hollow head of the hollow rails, and also under a part of the " bar, in those cases where hollow rails are used."

[Printed, 1*s.* 10*d.* Drawings. See Repertory of Arts, vol. 11 (*enlarged series*), p. 328; Patent Journal, vol. 4, p. 548; Engineers' and Architects' Journal, vol. 11, p. 170. Rolls Chapel.]

A.D. 1847, October 21.—N° 11,918.

NEVILLE, James.—" Certain improvements for conveying goods " and passengers on railroads." " In a mode of using or apply- " ing a flexible" and continuous "tube made of the strongest " navy canvass, coated with a solution of marine glue, so as to " render it air-tight and durable; and where great pressure may " be required, sometimes two or more thicknesses of such pre- " pared canvass with double or treble stitching on each selvage" are used, "or the said tube may be woven as one continuous " cylinder without a seam, but in either case such tube or hose " should be sufficiently strong to resist an internal pressure of at " least thirty pounds per square inch on the flexible hose; this " hose is to be continued to and forms a communication with " certain stationary air vessels worked by steam engines placed at " any distance along the line which may appear most suitable or " convenient for the traffic of such railroad. To each stationary " engine are attached two (or more) rotary force pumps for work- " ing the railway."

[Printed, 1*s.* 6*d.* Drawings. Rolls Chapel.]

A.D. 1847, November 2.—N° 11,934.

DUNN, Thomas.—" Improvements in the manufacture of rail- " way wheels and axles, and in machinery and apparatus for " placing carriages on to a line of rails, for removing them from

" one line of rails to another, and for turning them." "In " improved traversing trucks or lorries running upon cross rails " placed on the same level as the rails of the permanent way, on " which railway carriages may be removed from one line of rails " to another, and turned when requisite upon a turntable placed " between the lines of the railway, or in any other convenient posi- " tion comprizing the moveable length of rail forming part of the " permanent way; the cams for raising the same to make inclined " planes for the carriages to ascend on to the traversing truck or " lorry, and to descend from the same; the peculiar shape of the " lorry, which admits of the rails being kept very little above the " level of the permanent way; the flanges of cross rails; the wheels " of the traversing truck or lorry, which are made without flanges, " thus obviating the necessity of making grooves or recesses in " the rails of the permanent way; and the turntable, when used " for turning the traversing truck or lorry with the railway " carriage upon it."

[Printed, 1*s*. 4*d*. Drawings. See Mechanics' Magazine, vol. 48, p. 452; Practical Mechanics' Journal, vol. 2, p. 153; Patent Journal, vol. 5, pp. 121 and 152; Engineers' and Architects' Journal, vol. 11, p. 169. Rolls Chapel.]

A.D. 1848, January 5.—N° 12,014.

FROUDE, WILLIAM.—"Improvements in the valves used in " closing the tubes of atmospheric railways." "The constructing " and applying a valve or diaphram of greater width than the " boundaries of the seat in which it is to rest, and in such manner " that the edge or edges of the diaphragm or valve along the line " or lines of opening shall be so formed that when strongly " pressed the line or lines of opening shall be closed and rendered " air-tight, or nearly air-tight, by straightening or comparatively " straightening that bent or angular form of cross section which " the valve is to be made capable of assuming when free, the " excess of width which the diaphragm or valve endeavours to " resume being provided for, either by sufficient extensibility in " the seat of the valve, or sufficient compressibility in the parts of " the valve itself, or by both of these methods combined. And, " further, it is essential that the point of principal flexure in " straightening the valve shall be carried either beyond the " straight line, or so near it that the elasticity brought into action "by the straightening shall tend to keep the same closed, or "otherwise not be able to cause the valve to resume its bent "form."

[Printed, 8*d*. Drawings. See London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 10; Repertory of Arts, vol. 12 (*enlarged series*), p. 90; Artizan, vol. 6, p. 227; Patent Journal, vol. 5, p. 177; Engineers' and Architects' Journal, vol. 11, p. 248. Rolls Chapel.]

A.D. 1848, January 13.—N° 12,024.

THOROLD, William.—"Improvements in turntables."

In a "centre pin, having a circular inclined plane and ratchet "combined, by turning the centre pin the frame can be raised or "lowered as may be required, within the limits of height of the in- "clined plane;" and in a "circular shield to divert any extraneous "matter from the working parts, and a sweeper attached to the "roll frame to carry any such matters into a receptacle through "an aperture in the bottom frame; and modes of constructing "and arranging the working rollers, constructing the top frame "in several divisions or compartments, and of various materials, "of constructing turntables without centre pins, and the usual "parts attached to them, of casting the working parts of turn- "tables on chills, of constructing the larger kinds of turntables "with moveable joints in the girders or beams supporting the "rails, and also for a more perfect mode of stopping such tables "at the point for communicating with the line of rail; for a "method of constructing the larger kinds of turntables so that "the power of a locomotive engine can be applied to turn the "table when loaded with the engine and its tender, when the "same shall require reversing on the line of railway; of con- "structing single slide tables in an economical mode, and of "raising or locking the centre of turntables when they require "turning."

[Printed, 2*s*. Drawings. See Repertory of Arts, vol. 12 (*enlarged series*), p. 182; Artizan, vol. 6, p. 249; Patent Journal, vol. 5, p. 225; Engineers' and Architects' Journal, vol. 11, p. 303. Rolls Chapel.]

A.D. 1848, January 27.—N° 12,046.

BARLOW, William Henry.—"Improvements in the manu- "facture of railway keys." "In so treating and impregnating "wood keys for railways with matter which is insoluble in water

" that the keys when used shall not be liable to expand or " contract. The wood keys having been cut to the desired form, " they are to be steamed for about four hours, they are then dried " at a temperature a little below boiling water for a period of " from eighteen to twenty-four hours, by which they are considerably shrunk, and on being taken from the drying stove, " and whilst hot, they are to be subjected to the saturating " process, which may be done by simple immersion for about " sixteen to twenty-four hours; or the process of saturation may " be greatly facilitated by placing the wood keys in vessels and " removing the air, and then admitting the composition, as is " well understood in saturating wood with various ingredients for " other purposes."

[Printed, 4*d*. No Drawing. See London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 46; Repertory of Arts, vol. 12 (*enlarged series*), p. 391; Artizan, vol. 6, p. 228; Patent Journal, vol. 5, p. 256; Engineers' and Architects' Journal, vol. 11, p. 304. Rolls Chapel.]

A.D. 1848, May 9.—N° 12,149.

GORDON, LEWIS DUNBAR BRODIE.—" An improvement or " improvements in railways." " It consists in forming the ends " of the rails so as to make an 'underlap' joint, the rails being " laid so that the end of one rests upon the end of another; the " joint is cut so that a stop may be introduced into the chair to " prevent the rails travelling through the chair, a circumstance " well known to those practically acquainted with the maintenance " of the permanent way; and in adapting thin sheets or plates " of malleable iron to form either cross sleepers or longitudinal " bearings for supporting the rails; in strengthening the sleeper " by a brace or braces; the centre hole in the sheet iron receives " a malleable iron 'ring post,' which is fixed in its place by " casting round its end a button of iron; the brace must be put " in its place before the metal is cast, and is fixed by the metal of " the chair. A mode of strengthening or fishing the rail at the " joint by means of a trough or other guider of malleable iron. " The chairs next the joint are made with a projection at one " side, and the sleepers are two feet two inches or so apart. The " trough girder rests on the projection of the chairs, and supports " the ends of the rails." And in the "use of a screw for fastening " the rail in the chair. It works through a nut which fits into a

" recess cast in the chair; there is a slot for the purpose of " allowing the screw and nut to be put in or taken out without " unscrewing the nut."

[Printed, 1*s*. Drawings. See London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 91; Mechanics' Magazine, vol. 49, pp. 420 and 474; Artizan, vol. 7, p. 83; Patent Journal, vol. 6, p. 61; Engineers' and Architects' Journal, vol. 11, p. 370. Rolls Chapel.]

A.D. 1848, August 11.—N° 12,237.

HEWITT, Samuel George.—" Improvements in certain parts " of railways." " The application of timber in constructing large " turntables. The contrivance intended to receive the shock and " relieve the turnplate from the sudden weight of a vehicle, " consists of a roller in a frame, which may form a part of the curb " placed under the extremity of each main beam; the part that " touches the rollers is bevelled from the middle towards each " end; when properly adjusted the surface will lie on the same " level as the other rails, and receive the wheels of an engine; " and as the lower part rests on the roller, the shock or con- " cussion will be communicated to them, and the weight gradually " received by the table as it advances along the rail. In con- " necting the main lines of rails with the turnplates by novel " arrangements of curved lines with moveable or switch rails and " points, and with turnplates. In having three main lines arranged " and combined with one turnplate, which will require not more " than one turn in removing a vehicle from one line to another. " The several modes may be extended to any number of lines of " rails, admits of large turnplates, and avoids the necessity of " placing them on the main traffic lines. The application of " mechanical arrangements to the moveable or switch rails, which " an engine in its progress along the rails can act upon, so as to " place the switch rails in a proper position for being passed over " before it arrives at the switch or moveable rail."

[Printed, 1*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 50, p. 163; Artizan, vol. 7, p. 155; Patent Journal, vol. 6, p. 186. Rolls Chapel.]

A.D. 1848, December 24.—N° 12,384.

BAKER, William, and RAMSBOTTOM, John.—" Improve- " ments in the construction of railway wheels and in railway " turntables." " In combinations and arrangements of cones,

" cylinders, or spheres, revolving and travelling freely between " two surfaces, for giving greater support and rigidity to the " moveable tops of railway turntables when carriages are passing " over them. The upper surface of the bottom plate is cast with " any convenient number of grooves, in which are placed the " spheres, and the under surface of the table top is provided with " corresponding grooves and is supported by the spheres. It is " preferable to have the external groove almost full of spheres " and the others about half full, by this means almost perfect " solidity at the edge of the table is secured, and a sufficient " number of bearing points in the other parts. The grooves in " which the spheres rotate are made with a larger radius than the " radius of the balls, so as to diminish the working surface of the " balls upon the top and bottom plates."

[Printed, 1*s.* 6*d.* Drawings. See Mechanics' Magazine, vol. 50, p. 620; Patent Journal, vol. 7, p. 132. Rolls Chapel.]

A.D. 1849, January 13.—N° 12,417.

GREENHOW, Conrad Haverkam.—" Certain improvements " in atmospheric railways." " Proposes that the tube shall be " suspended at intervals of six feet in a sling of malleable iron " one-eighth of an inch in thickness and three inches broad, in " such manner as to avoid damaging the tube by rivetting. The " sling is to be rivetted to upright supports, one on each side, " which are bolted down to a sleeper. The sling must embrace " the tube on each side to within twenty-five degrees of the longitudinal slit on the vertex of the tube, and be rivetted to the " upright supports. By this means the weight of the tube in the " sling will have a tendency to draw the points of the standards " or upright supports together, and their pressure on the tube " will assist its elasticity in closing the longitudinal slit after the " passing of the coulter. To facilitate the opening of the longitudinal slit for the passage of the coulter four horizontal wheels " are used, two inclined towards one side of the tube and two " towards the other. The distance between the extreme edges of " the wheels should be one-half of an inch greater than the " internal diameter of the tube, so that as the wheels advance " through the inside of the tube they increase its horizontal " diameter and cause the slit to open to twice the distance of the

" increase in the horizontal diameter. Immediately behind the " coulter there is a valve in the tube which forms the piston rod, " and by opening this valve air will pass through the piston rod " into the exhausted tube before the piston, and so assist in " retarding the train by destroying the vacuum in case of any " emergency occurring to render it necessary to do so; and in " obtaining a vacuum in the tube by causing water to fall from " an air-tight vessel or vessels to its barometrical level."

[Printed, 10*d*. Drawings. See Mechanics' Magazine, vol. 51, p. 64; Patent Journal, vol. 7, p. 172. Rolls Chapel.]

A.D. 1849, January 23.—N° 12,438.

BARLOW, William Henry.—" Improvements in the con-" struction of permanent ways for railways." " In constructing " the wrought-iron rails of railways so that each rail shall form its " own bed in the ballast without requiring the use of chairs or " sleepers or other expedients for supporting the same. In order " to effect this the rail is made of greater width than before " employed, and may be composed of two or more parts. The rails " are connected together at the joints by wrought-iron shoes, " and the distance between the rails or guage is maintained by " wrought-iron cross ties, which also serve to give additional " bearing surface in the ballast. At the joints the shoes are " bolted to the rail by means of wrought-iron bolts and nuts, and " the wrought-iron ties are bolted to the rail and shoes by similar " wrought-iron bolts. The object attained is the exclusion of the " use of timber in the permanent way, and thereby avoiding the " cost of renewing the same when decayed;" also in " a mode of " giving support to the joints of the rails ordinarily employed, " which is applicable to rails, chairs, and sleepers. It is accom-" plished by rolling or forming a piece or plate of wrought iron " from a quarter to half an inch in thickness, of such form as will " accurately fit the side of the rail. The length of this plate is " such that it can be keyed into the chairs on each side of the " joint chair as well as into the joint chair. The plate may be " keyed against the rail by wooden keys in the same manner as " the ordinary rails are keyed into the chairs."

[Printed, 1*s*. 10*d*. Drawings. See Repertory of Arts, vol. 14 (*enlarged series*), p. 136; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 91; Mechanics' Magazine, vol. 51, p. 93; Patent Journal, vol. 7, p. 174. Rolls Chapel.]

A.D. 1849, February 6.—N° 12,452.

BROWNE, John.—" Improvements in atmospheric and other " railways." "The improvements proposed in the atmospheric " railway is to do away with leakage by means of pressure. Over " the orifice of the cylinder are two plates of iron, tin, or other " substance. The plates are pressed together by means of a succession of springs which press upon a slighter board, this board " pressing upon the iron plate, which is made into a shape best to " admit of the pressure, allowing the travelling or connecting " link to go through without admitting too much of the outward " air into the cylinder. Spring-wheeled pineers may be used, if " required, as a further security from the admission of the outward air. These iron plates are held and continued in their " position by being surrounded by leather, to the facing of which " may be fixed gutta-percha on account of the friction. Above or " below this range a long slip of gutta-percha or other substance " may be made to act for and in the same maaner as the iron " plates," and in " having a line of rail or rails, by which means " a line or chord communicating with a balloon will allow of that " line with the balloon attached to travel without impediment, " that is, having a line of rail of that peculiar construction that " will allow a holder formed of metal or other substance, having " wheels; the wheels work upwards or sideways, the power being " relative, instead of downwards; this holder may be made to " admit persons riding upon it who may be useful in keeping the " rails clear of impediments. To this holder is attached the balloon with it car of passengers. In crossing lakes, marshes, or " rivers, the line may be under water, floating upon the water, or " made to go upon bridges, archways, or cemented bridges."

[Printed, 4*d*. No Drawings. See London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 111; Mechanics' Magazine, vol. 51, p. 142; Patent Journal, vol. 7, p. 193. Rolls Chapel.]

A.D. 1849, February 28.—N° 12,492.

PARSONS, Percival Moses.—" Certain improvements in railways, railway engines, and carriages, and certain of their " appurtenances." " Firstly, improvements in the turntables " used on railways, whereby the revolving platform when at rest " is supported partly on a centre pivot, and partly on a series of

" moveable or temporary bearings at or near the periphery, which " bearings are forced under the revolving platform by means of " self-acting agents, such as weights or springs, and when the " table is required to be turned, the moveable supports are with- " drawn, and kept so during the operation, and the platform left " supported on the centre pivot alone. Secondly, three several " improved modes of laying and securing the rails of railways, " whereby the chairs generally used when cross sleepers are " employed are entirely dispensed with, and the rails secured " both to cross and longitudinal sleepers in a more durable and " efficient manner than heretofore. Thirdly, improvements in " the switches of railways. To make two pairs of switch tongues, " two bars are cut through by plane surfaces square with their " base, and in opposite longitudinal oblique directions to the " angle required for the points of the switch tongues. A portion " of the point is then cut off as being useless, from about where " the cutting plane meets the upper part of the inclined sides. " The tongues are then ready to be fitted to their places, the flat " sides being always placed against the fixed rails. A notch on " each side is cut out of the bottom flange or angle of the tongue " rail near the thick end, and the chair is made with a stop partly " lipped over, and the end of the tongue rail is dropped over this " stop, the notch allowing it to do so, after which it is pushed " forward until the part of the bottom flange remaining at the " end touches the stop on the chair, and is covered by the part " lipped over. The fixed rail is then keyed into the chair against " the end of the tongue, which keeps it in its place. Fourthly, " improvements in the crossings of railways; the point of the " crossing is formed on the same principle as that of the switches, " but the point is formed out of one piece of iron, which must be " made to the form which two pieces of the above description " would give when cut off to the angle required for the crossing " and placed together."

[Printed, 1s. 10*d*. Drawings. See Mechanics' Magazine, vol. 51. p. 211; Patent Journal, vol. 7, p. 239. Rolls Chapel.]

A.D. 1849, March 14.—N° 12,514.

CLARKE, THOMAS, and MOTLEY, THOMAS.—" Certain im- " provements in obtaining and applying motive power; also " *improvements* in railroads and other roads, and in supporting

" pressure, resisting strain, and protecting against fire." " In " applying motive power to the working of excavating machines. " The machine works in the same manner as men would do with " a shovel. A crank connected to a bar, and set in motion by a " spur wheel and pinion, a radius bar attached at one end to the " frame of the machinery, and at the other end to the bar before " mentioned. By the revolution of the crank, such motion is " given to the shovel as to cause it to describe a curvilinear " course. The shovel is not rigidly fixed to the bar, but turns " on an axis, so that when it is at the highest point it is turned " round by a man by means of a handle, and its contents emptied " on a platform. The machine, with the steam boiler and all " appurtenances, turns horizontally on a centre, therefore when " the machine moves forward equal to what the cutter is capable " of cutting at each stroke, it then moves horizontally around a " centre equal to half the circle, cutting the two sides and front " parts of the 'cutting' before it receives the next progressive " motion. Cutters are to be exchanged for the shovel whenever " the ground may require it, the purpose of these cutters being " to break up the ground after the manner of a pickaxe."

[Printed, 4s. Drawings. See Mechanics' Magazine, vol. 51, p. 282; Patent Journal, vol. 8, p. 31. Rolls Chapel.]

A.D. 1849, March 28.—N° 12,552.

REYNOLDS, Osborne.—" Certain improvements in railways." " The improved chairs are made of cast iron, with ribs or " knuckles, or other strengthening pieces of wrought iron, in" corporated more or less therein in the process of casting. The " chair may be of any approved form, and the wrought-iron " pieces also be of any forms most likely to accomplish the object " in view. A chair of this description is well adapted for the " joints of rails, where great strength is particularly desirable, " and where the interposition of such thin plates between the " abutting ends of two rails is of no consequence. The pieces of " wrought iron ought to be thoroughly cleansed from rust, or " tinned, or otherwise prepared before the cast iron is poured " over them." And in " an improved mode of constructing " the keys or wedges used for fastening rails in the chairs, " whereby their ordinary tendency to become loose after they " have been for some time in use is much, if not altogether

" counteracted, and they are prevented from falling out under " any circumstances. Also an improved mode of constructing " splint pieces for strengthening the joints of rails; the strength- " ening piece is of wrought iron, and imbedded in the cast iron, " all but the outer edge, which protrudes a little beyond the outer " surface of the splint. The splints are made of a combination " of vulcanised caoutchouc, or other suitable elastic material, " with cast or wrought iron."

[Printed, 6*d*. Drawings. See Mechanics' Magazine, vol. 51, p. 331; Patent Journal, vol. 8, p. 7. Rolls Chapel.]

A.D. 1849, April 26.—N° 12,588.

FAULCONBRIDGE, WILLIAM.—"Improvements in the manu- " facture of hose pipes, driving bands, and valves for atmospheric " railways."

[No Specification enrolled.]

A.D. 1849, June 14.—N° 12,659.

BARLOW, PETER WILLIAM.—" Improvements in parts of the " permanent ways of railways." " It consists, first, of casting " two or more chairs on supports, in combination with such a " plate or bearer that the use of wood or other sleepers may be " dispensed with, the plate or bearer cast with the two or more " chairs acting not only as the means of connecting the chairs " together, but also as the sleepers for such chairs. And, secondly, " of casting those chairs which are to be fixed to wood or other " sleepers of railways in two parts."

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 15 (*enlarged series*), p. 72; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 397; Mechanics' Magazine, vol. 51, p. 597; Artizan, vol. 9, p. 148; Patent Journal, vol. 8, p. 151. Rolls Chapel.]

A.D. 1849, June 14.—N° 12,661.

HENSON, HENRY HENSON.—" Certain improvements in railways " and in railway carriages." " Improved forms of rails for rail- " ways, and modes of securing the same; the rail is of an oblong " section, with two projecting arms or wings, or may be rounded " at the corners, at the top it is slightly bevilled inwards so as to " correspond with the usual bevil in the rims of railway carriage " wheels, at bottom it is bevilled in precisely the same way as at " *top,* in order that when worn away at top it may be turned

" upside down, and a fresh surface be brought into work. The " rail is sunk up as far as the arms or wings into a recess in the " sleeper, and is farther secured by bolts passed through the " arms." Also another form of rail without any bevil either at top or bottom. " Instead of sinking one half of the rail in the sleeper " in the manner above mentioned, it may be secured to the " surface" of the sleeper. " In some cases the baulk is placed " upon transverse pieces of deal or other timber, which may be " one and a half inch thick by eleven inches wide. Fillets" are used " to secure the baulk upon the deal surface, also other " fillets or pieces of timber which secure the rail in its proper " position, and are screwed, or otherwise firmly fixed to the " baulk. The fixings of the rail pass through fillets into the " baulk."

[Printed, 10*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 51, p. 577. Rolls Chapel (*with a Disclaimer*).]

A.D. 1849, June 28.—N° 12,679.

WOODS, Edward.—"Certain improvements in turntables." In obtaining "great lightness and durability in the framework of the " tables, and in constructing the skeleton framework of the top " or revolving part of the turntable. A circular horizontal " bearing ring of malleable iron of convenient section, serving as " an exterior bond for the framework, and forming the medium " through which that part of the pressure of the revolving top, " and its superincumbent load, which is not sustained by the " centre pin or socket of the turntable, is transmitted to the " rollers, the under surface of the said ring being truly formed " and otherwise adapted to rest or traverse upon the rollers in the " ordinary manner. In order to render the ring circular & true " in form, after the ends are welded up the iron is heated red " hot, and caused to be passed in that state through rollers. " The surface which is to traverse upon the rollers may be turned " up true in the lathe. The quality of the iron should be such " as will permit of welding without difficulty. Two horizontal " parallel bars are laid across and upon the ring. These are not " only an essential part of the top frame, but also constitute a " line of railway across the turntable."

[Printed, 10*d.* Drawings. See London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 73; Mechanics' Magazine, vol. 52, p. 19; Artizan, vol. 8, p. 40; Patent Journal, vol. 8, p. 164. Rolls Chapel.]

A.D. 1849, September 6.—N° 12,758.

MACNEILL, Sir John, and BARRY, Thomas.—"Improvements in locomotive engines and in the construction of railways." "They consist in the application of metallic sleepers to the construction of railways. The metallic sleepers being composed of maleable iron, flexible cross bars and cast-iron plates are cast to the proper angle required to make the rail stand at the suitable position for the tiers of the wheels. The joint sleepers are made strong and large for the purpose of making the rail as near as possible to one solid bar, and at the same time by means of cross tiers of maleable iron united to the cast iron, the way or road acquires the necessary elasticity, and all the rigidness of the longitudinal sleeper also. The manner of uniting the rails to the sleepers by rivets or screw bolts makes the line secure, so that it is almost impossible to remove a rail or any portion of rails from the line," and many other advantages are gained by this description of sleeper."

[Printed, 1*s*. 2*d*. Drawings. See Repertory of Arts, vol. 5 (*enlarged series*), p. 111; Mechanics' Magazine, vol. 52, p. 195; Patent Journal, vol. 8, p. 284. Rolls Chapel.]

A.D. 1849, September 13.—N° 12,767.

CHAMEROY, Edme Augustine.—"A new system of railway, denominated (helicoide) helical railway, and a circular chariot." "It is destined to transport all objects vertically, and by these means to serve as branch lines to unite those already operating on level surfaces, but at different elevations. The same process is applied to work mines for lowering miners and raising minerals, and to other purposes. This system of railway may be constructed in two distinct ways; the first consists in the establishment at the interior of a well or cylinder of a consecutive line of rail, 'helice' (circular line) continued up to the extreme height of the said well or cylinder, in such manner that there may be from each step of this 'helice' an interval sufficiently large to give passage for a series of wheels, and a waggon or carriage placed on a circular 'plateau,' and which is loaded with goods or passengers; the motion is transmitted to this 'plateau' by means of a vertical shaft that passes down the centre of the well. The second is by disposing a series of

" rollers, mounted upon axes and fastened to the interior wall " of the well at fixed distances, forming a circular line round " the same up to its extremity. These rests form the road, and " serve to ascend or lower down a carriage, to which is attached " a circular or 'helicoide' railway, raising or lowering the chariot " or plateau, upon which the goods or objects are placed. The " motion is given to the rollers by means of an endless rope."

[Printed, 1*s.* 6*d.* Drawings. See Mechanics' Magazine, vol. 52, pp. 220 and 258; Artizan, vol. 8, p. 119; Patent Journal, vol. 8, p. 297. Rolls Chapel.]

A.D. 1849, October 12.—N° 12,809.

TORKINGTON, John.—" Certain improvements in the con- " struction of chairs for railways." "The uniformly supporting " joint chair." "This chair consists of an iron rib or beam about " three feet in length, on the upper side of which are three holders " or chairs cast on or attached thereto, similar in form to the " detached chairs now in use. Two of these holders or chairs " are situated at the ends, and the third in the centre of the " length of the rib or beam, the upper side of which rib or " beam forms a support for the ends of two adjacent rails, which " meet at the centre of the middle holder or chair, and are there " held by a key or wedge in the usual manner. Similar keys or " wedges are inserted in the two end holders. By this arrange- " ment the bearing of the ends of the rails on the chairs, which " now seldom exceed two inches, is increased to about eighteen, " and the unyieldingness of the rails under pressure, and steadi- " ness of the carriages passing over them, are increased in the " same proportion. The arrangement is one combining at once " all the advantages of the longitudinal system of laying sleepers " with those attending the use of transverse sleepers or blocks."

[Printed, 10*d.* Drawings. See London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 315; Mechanics' Magazine, vol. 52, p. 299; Engineers' and Architects' Journal, vol. 13, p. 230; Patent Journal, vol. 9, p. 20. Rolls Chapel.]

A.D. 1849, December 15.—N° 12,893.

WYTHES, George.—" Improvements in apparatus for receiving " and retaining the rails of railways."

[No Specification enrolled.]

A.D. 1850, January 3.—Nº 12,917.

BARLOW, Peter William, and BARLOW, William Henry.
—" Improvements in the permanent ways of railways."

" In constructing longitudinal bearers of those parts of the
" permanent ways of railways called switches and crossings,
" whereby bearers for such purposes are cast with suitable chairs;
" in connecting that description of trough rails which take their
" bearing on the ballasting by rivetting such rails to their
" bearers;" and in " constructing parts of the permanent ways
" of railways by the use of transverse and longitudinal bearer,
" each having cast thereon two or more chairs. The upper or
" moveable part of a turntable is formed of plates of iron rivetted
" to lengths of T iron, with a circular ring of angle iron under
" the outer edge or circumference, and with the exception of this
" ring, and the lengths of T iron, there is no framing used, the
" whole strength being obtained by the iron plates of which the
" table is composed, and the trough rails are rivetted across
" the plates of which the upper part of the table is formed. By
" this arrangement the moveable part of the table is, with the rails
" thereon, made into a circular girder or beam by rivetting or
" bolting the plates together by the aid of T iron; or the plates
" may be bolted to one another, and the rails are bolted to the
" plates, by which it will be found that all parts contribute to the
" general strength. The turntable is supported at its outer edge
" by rollers, similarly to what has before been done."

[Printed, 2*s.* 2*d.* Drawings. See Repertory of Arts, vol. 16 (*enlarged series*), p. 278; Mechanics' Magazine, vol. 53, p. 16; Practical Mechanics' Journal, vol. 5, p. 65; Artizan, vol. 9, p. 148; Patent Journal, vol. 9, p. 164. Rolls Chapel.]

A.D. 1850, February 7.—Nº 12,962.

ORMEROD, Edward, and SHEPHERD, Joseph.—" Improve-
" ments in or applicable to apparatus for changing the position of
" carriages on railways."

" In the construction and arrangement of the apparatus
" generally known as the traversing truck, and used for changing
" the position of carriages on railways, by transferring them from
" one line to another of the rails, on which such carriages ordi-
" narily run in such manner as that the carriage may be placed
" thereon and removed therefrom, and transferred to another line
" of rails without disturbing the fixedness of the permanent rails.

" This is effected by means of an oscillating or vibratory frame or " stage adjustable, as occasion requires, as an inclined plane, " up or down which the carriage may be moved from or to the " permanent rails, and as a horizontal support for the carriage " whilst being traversed from one to another line of the permanent rails, with suitable adjuncts for producing or maintaining " such several adjustments. Also in the combination, arrangement, and application of switch apparatus for placing on and " withdrawing from the permanent rails of the railway inclined " planes, to be used when required to facilitate the placing and " removal of carriages upon and from traversing trucks or lorries, " ordinarily used for transferring carriages from one line of rails " to another."

[Printed, 1*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 53, pp. 119 and 381; Practical Mechanics' Journal, vol. 3, p. 233; Patent Journal, vol. 9, p. 223. Rolls Chapel.]

A.D. 1850, April 5.—N° 13,029.

SAMUEL, JAMES.—" Certain improvements in the construction " of railways and steam engines."

In more effectually securing the "permanent rails of railways " in their proper positions, and also for the purpose of making " such permanent way more durable, and reducing cost of the " maintenance thereof. The longitudinal trough sleepers are " made of cast or wrought iron, and the rails fixed firmly in the " troughs of such sleepers by means of wooden linings." There is a "variety in the shape of the sleeper," in which "the " flanches are placed horizontal, and the sides of the troughs " serrated; the wooden linings extending the length of the " sleepers only. The object of serrating the sides of the troughs " is to make them hold the wooden linings more securely, and " prevent any tendency which they might otherwise have to " move longitudinally. In another variety the only material " difference is that the flanches of the sleepers are corrugated to " make them stronger without materially increasing the weight " of metal." Also in " constructing the sleepers of wrought iron. " The flanches are" sometimes "corrugated on one side of the " railway, and plain on the other side. The bottom of the " flanches are secured by means of wrought-iron clips or ties, " and the centre one forms part of the tie rod connecting two " sleepers together." Also in having "metallic bearing plate or

" chair sleeper, the whole of which is made of one and the same " piece of metal. This bearing plate consists of a chair and " sleeper made in one piece, the chair being made with only " one jaw, to which the rail is to be secured by means of bolts " and nut or rivets."

[Printed, 4s. 8d. Drawings. See Mechanics' Magazine, vol. 53, pp. 299, 401, and 449; Artizan, vol. 9, pp. 148 and 195; Patent Journal, vol. 10, p. 46. Rolls Chapel.]

A.D. 1850, June 12.—N° 13,132.

NEWTON, William Edward.—(*A communication.*)—" Certain " improvements in the construction of railways."

" The use of transverse sleeper is dispensed with, and in place " thereof the cast-iron chair is cast on a plate of such a form and " dimensions as to resist the downward pressure of heavy weights " as well as lateral displacement by the wheels of the carriages. " In order to preserve the rails in their parallel position, and " prevent the sleepers or bearing plate from being displaced " sideways, the under surface of the said sleepers have cross " flanges or projecting ribs cast thereon. One of these flanges " or ribs runs parallel with the rails, and, being sunk into the " ballast, resists any lateral pressure, while the other flange or " rib runs at right angles to the rail, and serves to give strength " and stiffness to the sleeper, and also prevents any longitudinal " displacement. In order further to secure the perfect parallelism " of the rails the sleepers are connected traversely by wrought- " iron rods or bars, which will not have any other effect upon the " sleepers than to prevent them from moving asunder transversely, " leaving the sleepers otherwise perfectly independent of each " other; so that if one sink it may be raised and properly adjusted " without interfering with the sleeper at the opposite end of the " transverse rod or bar. It is not, however, absolutely necessary " to employ this tie rod, and therefore it may under some cir- " cumstances be dispensed with."

[Printed, 10d. Drawings. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 356; Mechanics' Magazine, vol. 53, p. 514; Patent Journal, vol. 10, p. 140. Rolls Chapel.]

A.D. 1850, July 3.—N° 13,158.

HOBY, James Ward.—" Certain improvements in the con- " struction of parts of the permanent ways of railways, and in " shaping iron."

" In a mode of securing rails upon longitudinal or transverse " sleepers by means of curved or angular lips on one side, and " by means of ribs or studs and keys on the other side. In " applying chocks along each or either side of a line of rails, " either with or without keys, for the purpose of securing such " rails upon longitudinal or transverse bearers or sleepers. In " constructing the troughs of longitudinal iron trough sleepers " or bearers for holding and securing rails, so that one side or " shoulder of each trough shall fit and support one side of the " rail placed within it, and also so that a key or keys may be " introduced within the trough on the other side of the rail for " the purpose of supporting it. In constructing longitudinal " bearers so that a shoulder or side of each such bearer shall fit " to and support one side of each of the rails placed upon it, the " other side being supported by means of chocks with or without " the aid of keys, or by means of a rib or studs and keys. In " constructing a stretcher of tubular or hollow iron, and also a " mode of combining such a stretcher with a tie rod." And also in "constructing railway keys of bent, curved, or other " similar forms, and also of constructing such keys of metallic " tube and wood."

[Printed, 1*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 54. p. 38; Engineers' and Architects' Journal, vol. 14, p. 64; Practical Mechanics' Journal, vol. 3, p. 230; Artizan, vol. 9, pp. 148 and 186; Patent Journal, vol. 10, p. 174. Rolls Chapel.]

A.D. 1850, July 17.—N° 13,179.

MELVILLE, JOHN.—"Certain improvements in the construc- " tion of railways and locomotive engines and carriages."

"The improvement consists in forming a continuous longi- " tudinal bearing or sleeper of cast-iron tubes, of circular elliptical " section, connected together by bolts and flanges, and having " along the upper side a rib or a channel, to which rails of " wrought iron, of certain peculiar forms are connected in any " suitable manner."

[Printed, 10*d*. Drawings. See Mechanics' Magazine, vol. 54, p. 95; Engineers' and Architects' Journal, vol. 14, p. 88; Patent Journal, vol. 10, p. 191. Rolls Chapel.]

A.D. 1850, August 3.—N° 13,211.

SHAW, JOSEPH.—" Improvements in constructing and work- " ing certain parts of railways." " This invention consists, firstly,

" in certain arrangements of apparatus for working the shunts or " moveable rails of railways, and rendering the transit of trains of " carriages from the main to branch lines, and from the branch to " main lines, more safe and convenient than at present; secondly, " in certain arrangements of apparatus for working visible and " audible signals; and, thirdly, in a means of rendering the gates " of roads which cross railways on a level self-acting. In all these " several arrangements, the desired effect are or may be attained " by the locomotive engine traversing over the line."

[Printed, 3*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 54, p. 119; Patent Journal, vol. 10, p. 218. Rolls Chapel.]

A.D. 1850, September 5.—Nº 13,246.

COCHRANE, William Erskine, and FRANCIS, Henry.—" Improvements in the pistons of steam engines, in fire-bars of fur- " nace, and in sleepers of railways." " In the sleepers of railways " there is a cast-iron plate, with vertical ribs or projections cast on " its upper surface, which form a trough on the plate to receive " the longitudinal wooden sleeper upon which the rails rests; " openings are cast at intervals in the sides of the ribs to receive " the foot or angular projections on each of the jaws which are " securely retained in their position by the wooden sleeper pressing " against their inner surfaces, and the jaws are caused to hold " the rail between them by a wedge in like manner to the ordinary " railway chair; the peculiarity consisting in constructing and " fixing the jaws in combination with the longitudinal sleepers of " wood."

[Printed, 1*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 54, p. 216; Engineers' and Architects' Journal, vol. 14, p. 166; Patent Journal, vol. 10, p. 258. Rolls Chapel.]

A.D. 1850, November 7.—Nº 13,316.

BROOMAN, Richard Archibald.—(*A communication.*)—" Im- " provements in railways;" consisting " in an improved method " of joining the different lengths of rail end to end, whereby the " upper surfaces with which the carriage wheels come in contact " are at all times kept flush one with the other, and at one uniform " level." The drawings show two **U**-shaped or bridge rails joined " together by a coupling bar of wrought iron, which is of the same " form in cross section as the hollows on the under side of the

" rails, and fits into these hollows with some degree of tightness; " this coupling bar is farther secured to two rails at the two ends " by rivets or screws. " The rivet holes at one end are punched out " of an oblong form to allow for the expansion and contraction of " the metal. One rail only is in the first instance riveted to the " bar, and after this has been laid in its place, the other rail is " rivetted up to it. The joint thus formed is perfectly stiff, both " vertically and laterally, yet at the same time permits of a sufficiency of play for the expansion and contraction due to the " difference of temperature."

[Printed, 6*d.* Drawings. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 358; Mechanics' Magazine, vol. 54, p. 396; Patent Journal, vol. 11, p. 85. Rolls Chapel.]

A.D. 1850, November 19.—N° 13,355.

DUNN, THOMAS.—" Improvements in machinery and apparatus " for moving engines and carriages from one line of rails to another " and for turning them; also for compressing certain substances, " and for raising and lowering heavy bodies."

" In placing intermediate wheels, when such are used in a " traversing truck, so that the peripheries of the wheels on the " outside axes project beyond the peripheries of the wheels on the " adjoining intermediate axes, or those next in line to them, " whereby as the truck is passing over the flange gaps of the " permanent way the shocks are reduced.

" In attaching inclined planes by spiral joints to a traversing " truck, to enable a carriage to be easily passed upon it when " required, and when the inclined planes are not in use they can " be folded to the ends of the truck to be out of the way. In " constructing a traversing truck so that the shelving which has " no rail attached to it supports the carriage by the flanges of the " wheels; and such traverser may be lowered at one end between " the rails of the permanent way, so as to form a gentle inclined " plane of the full length of the traverser for carriages to ascend, " or the traverser may be wholly lowered so as entirely to dispense " with the necessity for inclined planes. In attaching a portion " of what is usually called the permanent line of railway to a " frame, and in lowering such frame with a traverser upon it " untill the surface of the rails of the traverser and those on the " permanent way are on the same level, so that an engine or any

" other description of carriage may be run upon it without having " any of the weight to lift perpendicularly to enable such car- " riage to be traversed from one line of rails to another.

" In construction of a traversing truck with low horizontal " plates of wrought iron, supported by large external and small " internal wheels framed together by an angle iron, which forms " also the rail on the traverser. In a railway turntable so con- " structed that it requires no pit to work in."

[Printed, 3*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 54, p. 418; Patent Journal, vol. 11, p. 96. Rolls Chapel.]

A.D. 1850, December 7.—N° 13,394.

HOBY, JAMES WARD.—" Improvements in the construction of " the permanent way of railways."

" Firstly, in constructing the troughs of transverse iron trough " sleepers or bearers, for holding and securing rails, so that one " side or shoulder of each trough shall fit and support one side of " the rail placed within it; and also so that the key may be intro- " duced within the trough on the other side of the rail, for the " purpose of supporting it.

" Secondly, in constructing transverse iron bearers, so that a " shoulder or side of each such bearer shall fit to and support one " side of each of the rails placed upon it, the other side of each of " the rails being supported by means of chocks, with or without " the aid of keys, or by means of a rib and keys.

" Thirdly, connecting or combining the transverse bar with the " bearers without the aid of bolts, rivets, or keys.

" Fourthly, constructing railway keys of two wedges, or of two " wedge-like or tapering pieces, so that the wedges or pieces may " be driven or act in different directions.

" Fifthly, applying a piece of wood in combination with the " aforesaid double or foulding keys, when such keys are made of " iron."

[Printed, 10*d.* Drawings. See Mechanics' Magazine, vol. 54, p. 476; Artizan, vol. 9, p. 186; Patent Journal, vol. 11, p. 123. Rolls Chapel.]

A.D. 1851, January 14.—N° 13,452.

BARLOW, CHARLES.—(*A communication.*)—" Improvements in " the machinery for the manufacture of railway chairs."

" In forming railroad chairs from plates or flat bars of wrought

" iron by one operation, by which a piece of plate of the required " shape is first cut off, and afterwards pressed between two dies, " one of which is stationary and the other attached to a vertical " sliding head, by which the edges are beveled, and the holes for " the spikes are punched. Two cutters, secured to swinging arms " attached to another vertical sliding head, are then caused to " cut out and form the lips, after which the chair is thrown out " in a finished state, each revolution of the driving shafts forming " a chair."

[Printed, 8*d*. Drawings. See Mechanics' Magazine, vol. 55, p. 76; Patent Journal, vol. 11, p. 203. Rolls Chapel.]

A.D. 1851, February 7.—N° 13,493.

BERGUE, CHARLES DE.—" Improvements in and in the con- " struction of the permanent way of railways."

" Firstly, in constructing iron longitudinal bearers or sleepers, " for more effectually supporting the rails of permanent ways, by " so disposing the metal or disposing and combining the metals of " which they are composed as best to resist the strain to which " they are subjected by reason of the inequalities of the ground or " ballast, being chiefly tension at their lower portion or base, and " compression at their upper portion. The bearers are made in " such form that their bases shall be considerably stronger, or (if " wholly of cast iron) have a greater transverse sectional area " than their upper portions, in every case making their upper " parts of such forms as may be necessary for enabling them to " receive and support the descriptions of rails to be placed upon " them.

" Secondly, of transverse iron ties or bearers to be used in con- " junction with longitudinal bearers or sleepers. These ties are " made to have a transverse sectional form similar to the letter T " inverted, so that the ends of any longitudinal bearers or sleepers " (having flat bottoms) may rest upon the tie, and assist in keep- " ing the longitudinal bearers steady, and prevent them from " canting.

" Thirdly, of certain forms of rails, namely, an angular rail, " made so as to fit against one side and upon the top of the upper " part of the longitudinal bearers or sleepers, and also a saddle " rail so formed that the interior or under side of the tread or " working surface of the rail shall rest upon and be supported by

" the upper part of the bearer. The sides of the rail being bent " either to a right angle with the bearing surface of the rail, or to " such other angle as may be requisite to make the rail fit upon " and be held more securely by the top of the bearer upon which " it shall be placed."

[Printed, 10*d.* Drawings. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 360; Mechanics' Magazine, vol. 55, p. 137; Engineers' and Architects' Journal, vol. 15, p. 193; Patent Journal, vol. 11, p. 244. Rolls Chapel.]

A.D. 1851, February 10.—N° 13,500.

NORRIS, Richard Stewart.—" Certain improvements in the " construction of the permanent way of railways." " The invention " relates to a method of joining together, fastening, or supporting " the bars of railways, various parts of iron bridges, locks, and " other erections, and consist in effecting such object by casting " molten iron or other suitable metal upon or about the said " rails or other parts intended to be joined, fastened, or sup- " ported.

" In the use of a portable cupola and appendages for casting " portions of railways, bridges, locks, or other erections at or " about the situation where such articles are intended to be " used."

[Printed, 10*d.* Drawings. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 4; Mechanics' Magazine, vol. 55, p. 139; Engineers' and Architects' Journal, vol. 16, p. 72.; Artizan, vol. 9, p. 239; Patent Journal, vol. 11, p. 245. Rolls Chapel. (Specification No. 13,578).]

A.D. 1851, February 17.—N° 13,514.

DE PONS, Henry Francois Marie.—" Certain improvements " in constructing roads and ways and pavements or streets, and " the ballast of railways." " In combining together certain sub- " stances and forming with them a concrete composition, which " may be used for roads, pavements, streets, ways, and railways. " The following substances best adapted to carry out the inven- " tion :—Iron ore in slate or stone; iron reduced in small pieces; " granulated cast iron, either broken or in chippings and shavings, " iron or other metals reduced in pieces, or in clippings and " shavings, volcanic schistus, which is called volcanic gluten, after " having been submitted to the action of fire and pulverised and " converted into cement; all cements and hydraulic lime, plaster,

" sand, stone, iron, drosses, lags, bitumens, asphaltes, surphur,
" sulphate of alumina, or alumina and sulphate of iron.

" The patentee describes nine different processes by which he " combines the above-named substances, and says that the ground " on which they are to be laid must be macadamised, or so compactly pressed down that it presents a perfectly solid or even " surface."

[Printed, 4*d.* No Drawings. See Mechanics' Magazine, vol. 55, p. 158; Patent Journal, vol. 11, p. 255. Rolls Chapel.]

A.D. 1851, February 27.—N° 13,535.

ELLIS, THOMAS.—" Certain improvements in machinery or apparatus to be employod in the manufacture of blooms or piles " for railway and other bars or plates of iron." " Improvements " in the machinery or apparatus to be employed in the manufacture of blooms or piles for railway and other bars or plates of " iron, consists in a peculiar arrangement of mechanism for causing the rolls through or between which the bloom or pile is " passed to rotate first in one direction and then in the other, or, in " other words to rotate backwards and forwards, so as to obviate " the necessity of lifting the bloom or pile over the top of the rolls " as heretofore, an operation which is necessary in cases where " the rolls are rotating in one direction only."

[Printed, 1*s.* 6*d.* Drawings. See Mechanics' Magazine, vol. 55, p. 197; Practical Mechanics' Journal, vol. 5, p. 3; Patent Journal, vol. 11, p. 279. Rolls Chapel.]

A.D. 1851, March 24.—N° 13,565.

HILL, THOMAS.—(*A communication.*)—" Improvements in " wrought iron or malleable iron railway chairs."

" This invention consists of a wrought-iron railway chair made " from a plate of wrought iron by machinery which punches up " lips therefrom of the proper form to embrace and secure the " rail."

" Chairs of this description may be divided into several classes, " the principal of which are, first, that in which the lips of the " chair are presented sidewise to the rail, second; that class in " which the lips are presented edgewise thereto; and third, that " in which one or more of the lips are presented sidewise to the " rail, while the remainder are presented edgewise thereto. All "these classes admit of almost endless modifications in their "form, size, and proportions to adapt them to rails of different "forms and dimensions, and to the circumstances of any particular case."

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 18 (*enlarged series*), p. 232; Mechanics' Magazine, vol. 55, p. 278; Engineers' and Architects' Journal, vol. 14, p. 533; Practical Mechanics' Journal, vol. 4, p. 221; Patent Journal, vol. 12, p. 11. Rolls Chapel.]

A.D. 1851, April 26.—N° 13,602.

DALTON, DANIEL.—"Improvements applicable to railroads."

"The invention consists in various constructions and combinations of rails and longitudinal iron sleepers to be laid end to end "on the ballast so as to form in effect firm continuous iron "bearings and rails.

"When the sleepers are of cast iron, for the purpose of connecting the sleepers to each other, and to the transverse tye "rods, bolts and nuts are used for fastening the tye rods "to the sleepers, and the sleepers longitudinally to each "other.

"One key only is used, the support on one side being cast so "as to fit close to the one side of the rail, and in this case such "support may be extended throughout the length of the sleeper, "if desired, so as to form a continuous lateral support to one side "of the rail."

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 19 (*enlarged series*), p. 13; London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 95; Mechanics' Magazine, vol. 55, p. 376; Patent Journal, vol, 12, p. 70. Rolls Chapel.]

A.D. 1851, April 26.—N° 13,603.

HADDAN, JOHN COOPE.—"Improvements in the permanent "way of railways, in railway and other carriages, and in the "manufacture of papier mache to be used in making carriages "and other articles."

"The improvements in the permanent way of railways consists "in constructing it of two forms of rails or bars of iron to be "used with each other, one of them constituting a rail and a portion "of the sleeper and the other constituting the remaining portion "of the sleeper. The form of the two rails or bars which are to "be used together to form both sleeper and rail for one rail of a "single line of railway, and are so formed as not only to preserve

" the gauge, but also to prevent the rails from being forced to " assume a greater angle than the angle at which they are " originally connected."

"I connect single lengths of the rails together by riviting so " that each may project about one foot beyond the other; and I " connect the several lengths of the compound rail thus formed " by bolts and nuts, and in this connection make the ordinary " provision for expansion and contraction."

[Printed, 1*s.* 6*d.* Drawings. See Mechanics' Magazine, vol. 55, p. 377; Patent Journal, vol. 12, p. 60. Rolls Chapel.]

A.D. 1851, May 19.—N° 13,637.

PARSONS, PERCIVAL MOSES.—"Improvements in cranes " capable of being used on railways and in parts of railways." " The patentee claims (firstly), constructing switches for rail- " ways by fixing the main rails with the slabs or bars for the " support of the tongue rails on a wrought-iron plate extending " the whole length of the switch.

"(Secondly,) fixing the supports for the tongue rails on or " against the main rail itself when of a suitable form.

"(Thirdly,) in constructing the main rail itself in such a manner " as to form a suitable platform or support for the tongue " rail.

"(Fourthly,) constructing switches for railways by fixing the " main rails on separate cast or wrought iron plates to act as " sleepers, such sleepers being also furnished with slabs or bars " for supporting the tongue rails.

"(Fifthly,) fixing the chairs with their bars for the support of " the tongue rails to the main rails of the section.

"(Sixthly,) constructing the tongue rails of switches.

"(Seventhly,) constructing crossings for railways by fixing the " point and wing rails on a wrought-iron plate extending the " whole length of the crossing, having junction chairs attached " to it at the ends.

"(Eighthly,) fixing the wing and point rails on separate cast " or wrought iron sleepers.

"(Ninthly,) fixing chairs or saddles on or against the wing " rails to support the point rails, or by forming the wing rails " so as themselves to make a support for the point rail, or vice " versâ.

"(Tenthly,) forming the wing and point rails and sole plate in "one solid mass of wrought iron.

"(Eleventhly,) fixing the point rails by wedging them in "between the wing rails fixed on cast or wrought iron plates or "sleepers, either extending the entire length of the crossing in "one piece or in separate pieces, whether the junction chairs are "used or not.

"(Twelfthly,) the method of cutting two point rails out of one "parallel bar.

"(And lastly,) the making or constructing wing and check rails "of several forms and sections."

[Printed, 1*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 55, p. 437; Patent Journal, vol. 12, p. 93. Rolls Chapel.]

A.D. 1851, June 3.—N° 13,653.

ADAMS, William Bridges.—"Certain improvements in the "construction of roads and ways for the transit of passengers, of "materials, and of goods; also in buildings and in bridges, and "in locomotive engines and carriages, parts of which improvements are applicable to other like purposes." "The application "to the permanent way of railways of stone block sleepers, with "bolts passed through them to hold down the rails or chairs or "both, with or without the intervention of timber or similar "elastic material; also the application of longitudinal or transverse sleepers secured to stone blocks by bolts passing between "the blocks and secured to timber or other material below the "blocks; also similar arrangements substituting masses of brickwork or cement," or other material, "in place of stone blocks, "to secure the rails firmly, and when required, elastically, to a "sufficient mass of weighty ballast; also the use of side clamps "to secure the rail ends bolted below the rails, and forming a "chair if preferred; also the sectional forms of a deep single T-iron "rail and timber combined for permanent way, and a laterally "corrugated or grooved rail; also the construction and application of various forms of rails to produce lateral and vertical "stiffness, and which are called 'girder rails,' such girder rails "having a continuous vertical or partly vertical support lower than "the horizontal or partly horizontal bearing surface on the sleepers "or ballast; also the application to girder rails of cheek plates "and angle cheek plates on one or both sides, or tongue plates,

" or saddle or channel plates, or girder bearers or break joint, for " the purpose of connecting the girder rails or parts of them " together and making them continuous, and combining them in " any new form required; also modes of making curved rails by " forming the holes of the separate horizontal plates in curved " lines; also the application of hollow girders or rails as water " pipes, or perforated as drain pipes, and various other form " capable of this arrangement, by adding bottom plates; also the " application of elastic girder rails to permit elastic yielding of " the rail without disturbing the ballast below; also the con" struction and application of steel or steeled rails to form girder " rails; also the construction and application of portable railways " or agricultural or other light railways or tramways; also the " notched with staple holes; also the construction and application " of elastic railways, to diminish noise and vibration in streets or " on arches, or on buildings, particularly adapted for carrying " railways through towns."

[Printed, 3*s*. 2*d*. Drawings. See Mechanics' Magazine, vol. 55, p. 476; Practical Mechanics' Journal, vol. 4, p. 226; and vol. 5, p. 65; Patent Journal, vol. 12, p. 133. Rolls Chapel.]

A.D. 1851, October 2.—N° 13,760.

WARREN, JAMES.—" Improvements applicable to railways and " railway carriages, and improvements in paving." " The inven" tion consists in an improved sleeper of iron of a prismatic shape, " having cross ribs for the purpose of giving additional strength; " and also, when used transversely, outside bridge ribs under the " rail, so as to give an increased bearing for the lower flange of " the rail; between them wood, soft metal, or other suitable " material may be interposed if thought desirable. The sleepers " are packed underneath in the ordinary way, for which method " the form given to this invention will be found an improvement. " The sleepers are pierced with apertures of any convenient form " to admit of the escape of moisture from beneath; but where " the ends are open this arrangement may be dispensed with. " The sleepers are connected by tie rods of iron or by wooden " sleepers, or the two sleepers may be cast in one piece. The " advantages of this are believed to be, great facility in pack" ing, and consequently a saving in the cost of maintenance, " increased elasticity, thereby causing less wear of rails, and dura-

" bility; and an improved form of chair, by which the necessity
" for wooden keys is dispensed with, which may be used with the
" improved or other sleepers, and in one of which the action of
" the passing traffic causes it to bend on the rail and hold it more
" firmly; also in a modification of a clip, which is used at the
" joints of the rails when the ordinary chair is dispensed. It is
" bolted together and holds the ends of the rail firmly together."

[Printed, 3*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 56, p. 296. Rolls Chapel.]

A.D. 1851, October 9.—N° 13,765.

LILLIE, Sir John Scott.—" Improvements in forming or
" covering roads, floors, doors, and other surfaces."

" In combining metallic substances with coarse gravel, small
" pieces of stone, wood, or bricks, by means of concrete, bitu-
" minous compounds, or other cements; metallic bolts of a
" wedge-like or any other convenient shape are embedded per-
" pendicularly in this compound material in wooden or metallic
" frames somewhat similar to a harrow reversed, the space between
" the lines or metallic rows being filled up with any of the said
" materials combined with cement; blocks or slabs of any con-
" venient size or shape may be thus cast in moulds with grooves
" to prevent horses slipping, and thus laid on the surface of
" streets or roads already formed, or on any solid foundation, as
" flags are usually placed on footways."

[Printed, 6*d.* Drawings. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 450; Mechanics' Magazine, vol. 6, p. 318. Rolls Chapel.]

A.D. 1851, October 22.—N° 13,782.

BEATTIE, Joseph.—" Improvements in the construction of
" railways, and in locomotive engines and other carriages to be
" used thereon, and in the machinery by which some of the
" improvements are effected." " In constructing and forming
" compound longitudinal bearers in two or more parts. The parts
" which form such compound bearers are placed on transverse or
" semi-transverse sleepers having the ends of the pieces which
" compose the compound longitudinal sleeper running past the
" ends of their companion pieces and terminating on the next or
" more distant sleeper; by this arrangement great uniformity of
" bearing is obtained throughout the entire length of the per-
" manent way; and in constructing compound rails of three or

" more pieces, the two pieces which form the sides and bottom or " bearing portions to be made of common iron rolled to peculiar " sections. On and between these pieces is placed the top or " working portion of the rail, which is to be made of the very " best hard rolled iron to obtain the advantage of greater durability in working, and when manufacturing the top working " portion of the rail a rectangular groove is rolled in the top " surface, into which a bar of steel of a dovetail'd transverse " section is placed, and in passing the top portion of the rail " through the rolls to give it the required sectional form the " dovetail'd steel bar is conjoined and retained to form the hard " working surface required. The pieces which form the side and " bottom or bearing portions of the compound rail are made in " unequal lengths, so that the end of one piece will run past the " end of its companion piece, and thereby form scarfings with " the next adjoining pieces. These pieces have holes drilled or " punched through them in such manner that their ends will run " past each other, and corresponding holes are drilled or punched " through the web on the lower part of the working or top portion " of the rail, which portion is made longer than the sides and " bearing portions of the rail, and thereby reduce the number of " joints on the top working surface; and in forming a rail of " three or more elementary parts, the lower portion being divided. " This rail does not require any longitudinal timber bearings " under it. These parts may be made to form a series of scarfings with each other. The upper portion of the rail is made in " longer lengths than the lower portions. The upper and lower " parts are rolled to sections, whereby the top portion has descending flanges which overhang the top edges of the lower " portion of rail, by which they are embraced and the wet thrown " off; and in the use of longitudinal bearers of rolled iron, which " may be of various sections, to be adapted to and combined with " the ordinary double-headed rail known as Mr. Locke's, to form " a permanent way. The rolled iron bearers may be placed upon " longitudinal, transverse, or other sleepers, or they may rest " wholly on the ballasting; and in the construction and application of switches or points in such manner as to obtain greater " security to the trains passing over them."

[Printed, 5s. 2d. Drawings. See Mechanics' Magazine, vol. 56, p. 357; Engineers' and Architects' Journal, vol. 15, p. 194. Rolls Chapel.]

A.D. 1851, November 4.—N° 13,801.

ROBINSON, Joseph, MAY, Charles, and DOYNE, William Thomas.—" Improvements in the permanent way of railways."

" In obtaining continuous bearing to the under surfaces of the " rails on plates of wrought iron, fixed on either side of the rails. " The rails are supported by wrought-iron plates of angle iron " suitably formed to be fastened on either side of a rail, so as " to offer a continuous bearing to the under parts of the rail; " and the side bearing plates are, in laying down a railway, " to be laid on either side of the rail, so as to break joint " with each other, that is, that the joints on each side may not " come opposite to each other. The longitudinal supporting " plates offer a longitudinal support to the under parts of the " rail.

"The bearing parts are similar and come at the very bottom of " the rails, whilst the rails are held between the plates on either " side. A trough rail is used, the longitudinal bearing being " composed of the two sides or bearing plates coming within and " resting under the lower parts of the rail."

[Printed, 1*s.* 2*d.* Drawings. See Repertory of Arts, vol. 19 (*enlarged series*), p. 343; London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 449; Mechanics' Magazine, vol. 56, p. 39. Rolls Chapel.]

A.D. 1851, November 6.—N° 13,804.

DOULL, Alexander.—" Certain improvements in railway con- " struction." " It consists in forming the cast-iron chair com- " monly used in the construction or railways. The wedge is " secured in position by a screw bolt or rivet passing in the same " direction as the wedge, and passing partly through the wedge " and partly through the chair, the head of the bolt acting upon " the back of the wedge and the nut working against the side of " the chair. The wedge is screwed into its position, and not " damaged by being driven home by succesive blows of a maul," and in " laying the rails on chairs composed of malleable iron " and secured to sleepers of stone, wood, or metal, by bolts or " rivets; also a method of railway construction, in which inter- " mediate sleepers are employed with chairs cast in one therewith " so as to do away with bolts and keys altogether as fastenings " for the rails. The chairs are cast so that the cheeks do not

" come opposite each other; but they are at such a distance apart
" that when the two castings are laid obliquely in contrary direc-
" tions under the rail, the latter comes between the cheeks, after
" which castings are pressed in opposite directions, until the
" notches fit into each other; and when this is effected the cheeks
" of the chairs will be brought in close contact with the rail,
" and the interlocking of the notches will prevent the cheeks of
" the chairs from releasing the rail. The tie bars, which are
" necessary for the purpose of keeping the gauge, are placed at
" the junction of the two sleepers or castings, and bolted to each
" of them, and afford additional security that the notches will not
" be disengaged from each other by the action of the railway
" trains. To prevent rigidity, as also the vibration of the trains
" from transmitting a destructive effect to the chairs and sleepers,
" pieces of wood are placed under the rail in rectangular cavities
" or receptacles about three-eighths of an inch deep, and as broad
" and long as the casting will admit of, so that a small margin may
" remain to confine the wood in its place while being pressed upon
" by the rail."

[Printed, 1s. 8*d*. Drawings. See Mechanics' Magazine, vol. 56, p. 395; Practical Mechanics' Journal, vol. 5, p. 133. Rolls Chapel.]

A.D. 1851, November 13.—N° 13,811.

WILLSON, HUGH BOWELSBY.—"Improvements in the con-
" struction of rails for railways." "The object is to produce a
" compound rail to be employed in the construction of the
" permanent way of railroads, whereby the advantages of stability
" and durability, which would result from the use of a continuous
" bar, will be more nearly approached than by the plan hitherto
" adopted on railways. In order to effect this improvement, the
" rails are formed in two parts, which interlock into each other,
" or are prevented from shifting from their relative position by
" means superadded to those of tightening screws, or other
" analogous contrivances for effecting the union of the two parts
" composing the rail. These bars are provided with rebates, or
" otherwise furnished with means to prevent them from moving
" independently of each other, are put together in such a manner
" as to break joint (that is) the abutting ends of the bars forming
" one side of the rail will never be in a line with the abutting

" rods of the bars forming the other side of the rail. These bars " are constructed of rolled iron, and their upper edges form the " bearing surface of the rail."

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 93; Mechanics' Magazine, vol. 56, p. 415; Artizan, vol. 10, p. 193. Rolls Chapel.]

A.D. 1852, January 22.—N° 13,905.

ARMAND, Peter, le Comte de FONTAINEMOREAU.—(*A communication.*)—" Certain improvements in railways and " locomotive engines, which said improvements are also applicable " to every kind of transmission of motion." " It consists in " applying the principal of the wedge acting in a groove or " channel to the construction of railways and locomotive engines, " between which a greater adhesion is obtained when required. " For inclines, the wheel of the locomotive is constructed with a " groove at its circumference, made at an angle more or less acute " according to the gradient of the road, and is made to work upon " ordinary rails or upon wedge wheels. In that case it would be " necessary to make the motive wheels smaller, to enable the " machine to draw more easily a heavy train. That arrange- " ment, however, should only be employed on straight lines, or " nearly straight lines, for fear of the wheels not being able to " turn on sharp curves and getting off the rails."

[Printed, 1*s*. Drawings. See Mechanics' Magazine, vol. 57, p. 98. Rolls Chapel.]

A.D. 1852, January 31.—N° 13,941.

WILLIAMS, Owen.—(*A communication.*)—" Improvements in " preparing compositions to be used in railway and other struc- " tures in substitution of iron, wood, and stone." " To make a " composition suitable for the permanent way of railways, sleepers, " and other structures, take about 180 lbs. of pitch, 4½ gallons of " dead oil or creosote, 15 lbs. of raw brimstone, 18 lbs. of rosin, " 45 lbs. of finely powdered lime, 108 pounds of finely powdered " gypsum, 27 cubic feet of sand, gravel, or other hard material, " having been passed through a half inch sieve. The sulphur is " melted in a proper boiler with about 30 lbs. of pitch, then the " resin is added and heated till the mixture boils, the remainder " of the pitch is then added, and mixed and boiled up, and then " the lime and gypsum are introduced little by little, and well

" mixed up, and brought to boil; then the sand, gravel, or other " hard material, which must be perfectly dry and have been previously heated, is to be added, and then the dead oil, the whole " being constantly stirred up, well mixed and worked together, till " it is sufficiently heated; it is then to be thrown into moulds of " any required shape, and well pressed in, till the mould is " properly filled, and when cold it is ready to be taken out of the " moulds for use."

[Printed, 6*d*. Drawings. See Repertory of Arts, vol. 21 (*enlarged series*), p. 223; London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 199; Mechanics' Magazine, vol. 57, p. 139. Rolls Chapel.]

A.D. 1852, February 9.—N° 13,959.

JOHNSON, William Beckett.—" Improvements in railways, " and in apparatus for generating steam." " In constructing " turntable tops of wrought iron, the framework of the turntable top is constructed of bars of wrought iron, bent or made " in the form of sectors of a circle, four or more of which are " firmly bolted or rivetted together, the ends nearly meeting in " the centre. The roller path of the turntable top is formed by " holding, rivetting, or contracting upon the outside of the bent " bars when put together segments or complete circles of angle " iron. The centre may be made either of wrought or cast iron, " firmly bolted, rivetted, or contracted upon the ends of the " framework. The elevating or centre pin may be fixed to the " centre in any of the usual methods. The rails upon which the " carriage is received and supported during turning, are placed " on the top of this framework, and secured to it by chairs or " fixings, after which the spaces between and outside the rails are " fitted up with the ordinary planking secured to the framework " by bolts."

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 8; Mechanics' Magazine, vol. 57, p. 158; Engineers' and Architects' Journal, vol. 15, p. 315. Rolls Chapel.]

A.D. 1852, February 13.—N° 13,970.

GERVOY, Annet.—" Means to prolong the durability of the " rails on railways." The patentee says " it is found that the " wrought-iron rails of railways become crystallized and weakened " by the repeated vibrations caused by the passage of locomotive " and other carriages along them, and their durability is lessened

" as compared with those which are treated according to my
" Invention, which consists of taking up the rails after they have
" been in use during several years, and heating them for the
" purpose of restoring or bringing them again to a fibrous and
" tenacious character. And it will be evident that the time for
" taking them up will depend on the quality of the iron and on
" the extent of traffic on a particular railway, all which an
" engineer will be able to judge of."

[Printed, 6*d.* Drawings. See London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 96; Repertory of Arts, vol. 20 (*enlarged series*), p. 174; Mechanics' Magazine, vol. 57, p. 36; Engineers' and Architects' Journal, vol. 15, p. 267. Rolls Chapel.]

A.D. 1852, February 14.—N° 13,973.

CALLEN, Arthur Wellington, and ONIONS, John.—
" Certain improvements in the manufacture of certain parts of
" machinery used in paper making [and in the material employed
" therein, which material is also applicable to the construction of]
" certain parts of railways, railway and other carriages [and other
" similar and useful purposes]." " A process of casting in
" malleable iron from the hæmatite ore, to the manufacture of
" railway chairs and sleepers, so as to render the employment of
" them less liable to fracture than when, as at present, metal is
" made use of in a crude and brittle state; also to a method of
" casting all descriptions of working bearings in railway and other
" carriages, and in case-hardening such portions of the same
" as are most subject to friction." The process is not described.

[Printed, 4*d.* No Drawings. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 209; Mechanics' Magazine, vol. 57, p. 178. Rolls Chapel.]

A.D. 1852, March 8.—N° 14,018.

HODGE, Paul Rapsey.—(*A communication.*)—" Certain im-
" provements in the construction of railways, and railway
" carriages, parts of which are applicable to carriages on common
" roads." " The application of an electrical, or an electro-galvanic
" current being passed through either the up or down rail, and
" returned again in the opposite rail, so that a perfect circuit be
" kept up through the rails, either through the whole length of
" the line or any portion thereof, depending altogether on the
" strength of the batterys employed, thereby preventing a decom-
" position of the iron forming the permanent way, it being a well-

" known fact that the action of either a galvanic or electro-galvanic current will throw off all oxygen, preventing the oxidation of the metal forming the rails. Also a new arrangement of moveable 'points' used for crossing from one line of rail to another. The point which forms the junction of the two rails, and the two moveable limbs which radiate on the two pins or centres, are curved at the end for the purpose of admitting the flange of the wheel in between the point and the moveable link, either in passing from left to right or right to left. In order to ensure a continuous bearing for the wheel tyre while it passes from right to left or left to right, each moveable limb is operated on and pressed up to a point alternately by means of two buffer springs made of india-rubber or a spiral metallic spring. These springs are placed on an horizontal bar which is supported by the central partition of the bed plate, the bar at the same time plays freely through an elongated hole in each of the studs which project down from and are affixed to the moveable limbs."

[Printed, 1*s*. 4*d*. Drawings. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 120; Mechanics' Magazine, vol. 57, p. 259 and 462; Engineers' and Architects' Journal, vol. 15, p. 394. Rolls Chapel.]

A.D. 1852, April 24.—N° 14,089.

MANSELL, Richard Christopher.—"Improvements in the construction of railways, in railway rolling stock, and in the machinery for manufacturing the same." The first "consists in making rails of or in several new forms, combinations, and peculiar manufacture, and so to construct them that, when arranged and combined together, their ends or joints will be supported." The second, "in the construction of chairs, are two in number, one being constructed on the truss principle, by tension on one portion and compression on the other portions, the other being composed of two parts clamping the sides of the rails, and both descriptions being arranged for the better supporting rails at their joints." The third "in the construction of sleepers of two descriptions, one of which is formed by an iron box or dish casting, filled up with timber, to serve as a bearer and cushion for supporting rails. The other description admits of various modifications, and is constructed of timber in combination with iron, the timber being arranged in a novel

" position by having its grain or fibres placed vertically, or " approaching thereto, and thus presenting itself in its most " incompressible position for supporting rails, and its strongest " form for retaining them, when said rails are inserted. This " improved plan is also arranged so as to support the joints of " rails, and will tend to subdue or deaden the effects of con-" cussion between the railway and the stock rolling thereon." The fourth, "in the formation of joints at the ends of rails, " consists in several new methods of supporting them by means " of clamps and other ironwork, some of which supports are " secured at one or both sides of, and others below, the rails; some " also are in combination with sleepers, and others with tie rods " and distance pieces between the rails."

[Printed, 2*s.* 10*d.* Drawings. See Mechanics' Magazine, vol. 57, p. 375. Rolls Chapel.]

A.D. 1852, April 29.—N° 14,096.

BRUFF, PETER.—" Improvements in the construction of the " permanent way of rail, tram, or other roads, and in the rolling " stock or apparatus used therefor." " It consists of improve-" ments in the construction of railways, its object being to secure, " support, and strengthen the joints of the rails; and for such " purpose, a metallic clipping or clasping plain or welbed" is manufactured, "as may be found most desirable, as greater or less " strength is required. Into this metal clip, which is termed a " fishing key, the ends of each rail at its junction with the pre-" ceding or succeeding rail are received, and become securely " clasped, either by the natural spring of the metal when made to " fit tight, or by a wooden key, block, or wedge driven in by the " side of the rails in the usual manner."

[Printed, 8*d.* Drawings. See Mechanics' Magazine, vol. 57, p. 394; Engineers' and Architects' Journal, vol. 15, p. 426. Rolls Chapel.]

A.D. 1852, May 17.—N° 14,127.

NEWTON, EDWARD WILLIAM.—(*A communication.*)—" Im-" provements in the construction of docks, basins, railways, and " apparatus connected therewith, for raising or removing vessels " or ships out of the water, or on to dry land for the purpose of " preserving or repairing the same."

[Printed, 1*s.* 4*d.* Drawings. See Mechanics' Magazine, vol. 57, p. 435. Rolls *Chapel.*]

A.D. 1852, June 24.—Nº 14,182.

McCONNELL, James Edward.—“ Improvements in steam
“ engines, in boilers, and other vessels for containing fluids, in
“ railways, and in materials and apparatus employed therein or
“ connected therewith.” “ The improvements in railways refer to
“ the construction of lines with continuous longitudinal sleepers
“ or bearings, but are also applicable for transverse bearings.
“ The rails themselves have a solid or flat-sided top, or a top of
“ such a section that the rail may be rolled on its top and bottom,
“ or on its foundation and wheel-bearing surfaces. This rail has
“ a bearing on the angular or double inclined surface of a con-
“ tinuous or longitudinal sleeper, which may be of triangular
“ section, with a flat base to rest on the ballast, whilst its angular
“ apex or ridge is upwards and bears the base of the rail, which is
“ rolled with a corresponding double incline or angular recess to
“ fit it;” also “ the rail is rolled with small angular projections
“ along the bottom surface of the edges of its base flanges, in
“ order that it may have a better lateral hold upon the sleeper,
“ which is correspondingly cut out or recessed; the upper sur-
“ faces of the two inclined rail flanges being flush, or in a line
“ with the two upper inclines of the sleeper. The latter is in this
“ arrangement of rectangular section, so that it rests upon an
“ angular ridge similar to the rail-bearing surface, the rail being
“ held down upon it by bolts passed through the rail flanges, and
“ the timber with nuts on the under side of the latter.”

[Printed, 1*s*. 4*d*. Drawings. See Mechanics' Magazine, vol. 58, p. 37; Engineers' and Architects' Journal, vol. 16, p. 113; Practical Mechanics' Journal, vol. 5, pp. 97, 107, and 175. Rolls Chapel.]

A.D. 1852, June 24.—Nº 14,189.

McCONOCHIE, John.—“ Improvements in locomotive and
“ other steam engines and boilers, in railways, railway carriages,
“ and their appurtenances; also in machinery and apparatus for
“ producing part or parts of such improvements.” “ The improve-
“ ments in railways consist, first, in so constructing a chair that
“ one side or jaw forms a self-acting key, and fits into the webb of
“ the rail between the heads thereof, and wherein the rail is so
“ held and supported that the bottom or lower head shall not rest
“ upon the sole of the chair. Second, in a method of trussing,

" and at the same time affording increased bearing surface to the " joints of the rails; and, third, in the construction of a turn- " table."

[Printed, 4*s.* 6*d.* Drawings. See Mechanics' Magazine, vol. 58, pp. 37 and 221. Rolls Chapel.]

A.D. 1852, August 7.—N° 14,253.

HIND, Roger.—" Certain improvements in the construction of " machinery or apparatus applicable to weighing machines, weigh " bridges, railway turntables, cranes, and other similar apparatus." " A novel form or construction of weighing machines for adjusting " the weight upon the springs of locomotive engines, a separate " table and weighing apparatus being adapted to each wheel of " the engine, whereby the exact weight upon each wheel can be " ascertained and regulated accordingly without altering the " position of the engine on the weighing machine. In the appli- " cation to railway turntables of an improved steelyard and " indicating apparatus, and also an apparatus for removing the " strain or stress from the working parts of the same when not in " use, and an improved arrangement of rollers and frame or roller " race upon which the said turntables revolve."

[Printed, 3*s.* 6*d.* Drawings. See Mechanics' Magazine, vol. 58, p. 154. Rolls Chapel.]

A.D. 1852, October 19.—N° 14,326.

NEWTON, Alfred Vincent.—(*A communication.*)—" An im- " proved mode of manufacturing railway chairs." The rolling of " railroad chairs in continuous lengths, which lengths are to be " divided off into any suitable lengths to form chairs, and are then " to be finished in the usual manner. The iron may be piled, " heated, and rolled, in any well-known manner to a proper shape " to enter the bending rolls; after being passed between the " bending rolls it is to be carried to a mandril situate between a " pair of grooved rollers, and by the action of these rollers it " is caused to take the required sectional shape."

(Note.) The drawings in this Specification do not correspond with the letter-press.

[Printed, 1*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 58, p. 375. Rolls Chapel.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 1.—N° 54.

RENSHAW, George Pearson.—(*Provisional protection only.*) —"Improvements in turn-tables and traverse-tables, and in the "apparatus connected therewith."

"This invention relates to a species of self-acting turn-table or "traverser for turning engines and wheeled carriages on railways. "The turntable or reversing apparatus has attached to it or con-"nected with it an arrangement of friction wheels or rollers, so "that when the locomotive is passed on to the table to be turned "the driving wheels of such engine are brought into gear or "contact with the rollers or other actuating apparatus; the "engine is then put in motion, and the revolution of the driving "wheels turns the gearing, and causes the table to revolve, or "the traverser to traverse. The gearing may be disconnected "at pleasure, to allow of working the reversing apparatus by "hand. The essential object of the plan being to cause the "locomotive to turn itself, along with other vehicles (if necessary) "when placed on the reversing apparatus, the connection between "such reversing apparatus and the engine may be made in "various ways to produce the required effect."

[Printed, 4*d*. No Drawing.]

A.D. 1852, October 1.—N° 57.

MACDONNELL, John Joseph.—"Certain improvements in "the construction of railways." "Relates to a metallic bearing "for the rails of railways, having ribs or fillets outside the "flanches of the rails, for the purpose of keeping in its place "packing of any yielding material between the rails and the "metallic bearing, with a tongue, rib, or steadying piece in the "middle of the metallic bearing to fit into the hollow of the rail. "The object of the invention is, firstly, to economise fastenings; "secondly, to give greater steadiness of bearing to the rail, by "the tongue, rib, or steadying piece fitting into the hollow of "the rail; and thirdly, to keep the packing in its place by "means of the outside ribs or fillets.

[Printed, 8*d.* Drawings.]

A.D. 1852, October 12.—N° 357.

DAFT, Thomas Barnabas.—"Improvements in inland con"veyance." In "constructing railways of wood, suitable for "sledges, preferring that the width between the rails should not "exceed two feet six inches. The carriages are to be sledges "suitably arranged to be propelled by steam, and connected "with a train, and are to be made to carry at most two passen"gers on each seat. The under surfaces of the carriages to be "shod with glass or other hard substance, and provision is to be "made for supplying water to the surface of the rails. The pro"pelling carriage is to be made with a single wheel with projecting "teeth on its periphery to take into the open fixed rack. By "these means a great or even a greater speed may be obtained "than is now common on railways where carriages are used with "wheels and axles, and, further, far greater ease and safety will "result than are at present enjoyed."

[Expired 7th year. Printed, 6*d.* Drawing.]

A.D. 1852, October 16.—N° 420.

YORK, John Oliver.—"Improvements in connecting and in "fixing rails in railway chairs." "The invention consists of "substituting a cast or wrought-iron wedge piece, pin, and key "for the wooden wedge usually employed for fixing a rail in a "chair; such wedge piece also answering the purpose of 'a fish "'piece,' now employed by some engineers."

[Expired 3rd year. Printed, 8*d.* Drawing.]

A.D. 1852, October 27.—N° 542.

CARR, Henry.—(*Provisional protection only.*)—"Certain im"provements in railways." Firstly, for an "improvement in “making the crossings of railways, by filling in the hollow on one side of the ordinary wing rail, or thickening the middle web of the I-shaped rail so as to make it flush or nearly so with the top and bottom flange, which filling in or thickening is continued to the part where the wheel first takes its full bearing on the rail, for the purpose of avoiding the splitting of the upper flange of the wing rails when the edge of the wheels bears upon the overhanging part.

“Secondly, for applying a similar filling in or thickening to the rails which form the ‘point’ or the point rails.

“Thirdly, for forming the two middle chairs of a crossing, commonly called the B and C chairs, so that the whole of the rails seated in each chair may be wedged up by driving in two wooden keys for preventing the motion of the point in the chair.

“Fourthly, for thickening the web of an ordinary switch or stock rail of the I form so as to support the upper flange when the wheels bear partially on the rails.”

[Printed, 6*d.* Drawing.]

A.D. 1852, November 6.—Nº 668.

DAY, CHARLES FREDERICK.—“Certain improvements in sleepers and other parts of the permanent ways of railroads.”

“A method of forming and constructing transverse metallic sleepers, and other parts of the permanent ways of railroads, by which parts the rails are attached to the said sleepers, have for their object, firstly, to give greater simplicity and security to the said permanent ways, by dispensing with the employment of chairs, nuts, bolts, spikes, and similar expensive contrivances hitherto employed in attaching the rails to the sleepers, and the nice processes of adjusting required for the same purpose; secondly, to render the said permanent ways more durable, by dispensing in the sleepers with the employment of the wooden parts and therewith of all the parts liable to decay or disarrangement, and by supporting the sleeper with a greater quantity of ballast or concrete; and thirdly, to give to that part of the ballast which is under the sleeper a thorough drainage, which it must always want under the present system.”

[Expired 3rd year. Printed, 10*d.* Drawings.]

A.D. 1852, November 8.—N° 672.

CAREY, STEPHEN.—" Certain improvements in the construction " of viaducts, arches, bridges, and other buildings upon a non- " expansive principle."

The " invention consists in the peculiar formation of bridges, " viaducts, arches, foundations, floors, roofs, girders, sleepers, " sea or river walls, light-houses or forts, bottoms of docks, and " all or every part or parts of any construction or constructions " to which the same can or may be applied, by means of blocks, " castings, plates, or other substances, moulded or formed " geometrically upon a non-expansion principle. A casting is " made of iron or other suitable material, having its sides, ends, " and shoulders convex, and being drilled with one or more " holes or slots, or having lugs and appertures to receive " the same as required for bolting or more perfectly securing " the blocks or castings to each other, the recess of such " casting being a section of the exterior; each casting is " dovetailed to the other, and each therefore acts as a truss " support, or binder to the other, and thus enables the work- " men to proceed in the construction of any work to which " the same is applicable without the aid of any supplementary " erections." Some castings are " formed with an oval or other " shaped figure, as may be best adapted for the purpose, to allow " the passage of gas, water, and other pipes to pass through " the structure longitudinally, and which may likewise, if required, " be carried transversely through the blocks or castings in the " same manner as through the ends thereof."

[Expired 7th year. Printed, 10*d.* Drawings.]

A.D. 1852, November 8.—N° 675.

CROWLEY, JONATHAN SPARROW.—(*Provisional protection " only.*)—" Improvements in the means of or apparatus for " working the signals and switches on railways." " The inven- " tion consists in working the signals on railways by means of " the flanges of the wheels of any carriage that is allowed to run " thereon. The flange of the wheels will in passing along the " rail come against and act on a lever which is in connection " with the signal apparatus. This signal apparatus is of the " ordinary construction, and the signal of 'caution' is always kept " up by means of an electro-magnet, which will hold down the

" lever that works the same, but immediately a carriage passes " along the line, and allows the flange of the wheel to strike " the first-mentioned lever, the electric circuit is broken, and the " power of the electro-magnet being thereby destroyed the signal " lever will be released and the signal of danger will immediately " be brought up by a weight and will remain up until the " circuit is again complete and the signal lever is again brought " down and held in its place by the electro-magnet. Instead of " causing the breaking of the electric circuit to work merely a " visible signal, the apparatus may be made to act on a bell or " other audible signal at the station or other part of the line.

" Switches are worked in a similar manner to signals."

[Printed, 4*d*. No Drawing.]

A.D. 1852, November 9.—N° 684.

DUNN, THOMAS, and WATTS, WILLIAM.—" Improvements " in the construction of railways."

" The invention consists, first, in constructing railway sleepers " with holes or with pipes through which the wet and moisture " from the surrounding ballast is carried off, thereby keeping the " ballast in a fit state for supporting the sleepers and diminishing " of cost of maintaining the permanent way of railways. And " secondly, in constructing cast-iron sleepers of certain improved " forms so that the contraction of the metal shall be equal distributed and that the sleeper when laid on the ballast shall be less " rigid than the cast-metal sleepers generally used.

" The drain pipe is conveyed into a gutter or side drain running " between or alongside the lines of rails. These improved sleepers " are intended to be placed about three feet asunder, from centre " to centre, in the same way as some of the cast-iron sleepers now " known and in use, and the distance between the rails is maintained uniform in the ordinary manner by tie rods. The " sleeper is particularly adapted for marshy ground, as the inverted " cone is furnished with a screw by which the sleeper takes " firm hold of the ground."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1852, November 13.—N° 742.

GREAVES, HUGH.—" Improvements in the permanent way of " railways," " First, an improved mode of forming the junctions

" of the rails in permanent ways whereby they are rendered firm " and secure; second, to an improved construction of joint chair; " third, to an improved construction of rail for use on inclines " and other places where great wear and tear occurs; and fourth, " to an improved mode of supporting the rails at the points or " crossings of the line."

The patentee claims, " first, a system of supporting the joints " of rails by a malleable iron girder or support, which support " may consist of a piece of rail.

"Second, the application and use of railway chairs with three heads.

"Third, the application and use of compound joint chairs.

"Fourth, the general arrangement and construction of permanent way.

"Fifth, the application and use of a compound rail."

[Expired 7th year. Printed, 8*d.* Drawing.]

A.D. 1852, November 19.—N° 792.

DE BERGUE, Charles.—(*Provisional protection only.*)—"Improvements in the permanent way of railways." "This invention consists of using longitudinal sleepers or bearers of square " timber, one angle being downwards in the earth and the other " angle upwards and covered with a trough rail fixed by screws " or otherwise. The joints of the rails may be formed by any " convenient means, but it is preferred to employ a bent plate of " metal let into the wood sleeper to receive the ends of two rails, " and then by bolts passing through the rails, the bent plate, " and the sleeper, to secure the rails, by which means a large " extent of bearing surface of the wood rests in the earth and the " wood is used in its strongest direction, and the bent or inverted " trough rail combined therewith may be comparatively light, and " the guage between the wood sleepers or bearers may be preserved in any convenient manner, it is preferred to do so by " screw bolts and nuts, and also by transverse timbers notched " out to receive the inner horizontal angles of the longitudinal " bearers or sleepers.

[Printed, 4*d.* No Drawing.]

A.D. 1852, November 27.—N° 894.

CURTIS, William Joseph.—" Certain improvements in the " formation of tramroads or railroads, and carriages that run

" thereon." "The trams or rails forming the railway may be " made out of the rough trees of the forest. In this instance " the smaller end of one tree rests upon the butt end of the " one before it, the butt being notched down to receive it; " the trees are buried or sunk in the ground, leaving about " one and a half inches of the upper side above the ground, and " the knobs or irregular parts being taken off with the adze or " other tool, or a slab cut off, so as to make the upper surface " straight. Sometimes the trees are laid side by side, breaking " joint, the upper side being made straight; also in some cases " flat planks, scantling, round poles, or small trees are used for " temporary purposes, such as for getting off a crop from soft land, " for getting timber out of forests, or other purposes, in which " case the timber is simply laid upon the ground; and in some " cases a stake or peg is driven into the ground by the side of " the timber to keep it in its place whilst the load passes over " it. In cases in which small trees are used as a permanent " railway it may be necessary to supply cross sleepers, in which " case the better mode will be to notch out the butt or larger " end of the rough sleeper and to lay the sleepers, the large and " small ends alternately. The trams will be thus perfectly " sustained both vertically and horizontally. Iron rails" are also used "which may be the same as those usually employed in " ordinary railways, or may be a flat bar bevilled off at the edges, " or other suitable shape. When a flat rail with a bevilled edge " is used, then the bevilled edge of the wheel may be reduced in " breadth; the upper surface of the iron rail may be an inch, " more or less, above the surface of the ground."

[Expired 3rd year. Printed, 10*d*. Drawings.]

A.D. 1852, December 3.—N° 946.

WARE, George, and FERNANDEZ, Albert Henry.—(*Provisional protection only.*)—"Improvements in the making of " wedges or keys for holding or tightening the rails within rail- " way chairs. And consists in covering a material or materials " with heated gutta percha, so as to produce one united mass " in a wedge form shape, which material or materials to be so " covered consists either of wood inclosed within roofing or " asphalted felt, or sand and ashes, or hemp and ashes, or cork " cuttings alone, mixed with heated tar, so as to form a substance "to be afterwards covered with gutta percha, as before described."

[Printed, 4*d*. No Drawing.]

A.D. 1852, December 7.—N° 987.

NEWTON, ALFRED VINCENT.—(*A communication.*)—"An improved mode of transportation, for the conveyance of letters, packages, freight, or passengers from one place to another." "Improvements in the method of transporting freight and passengers through air-tight cylinders, the pressure of the atmosphere behind a moveable plunger being used to propel the load, the air in advance of the plunger being exahusted. By means of these improvements, letters, packages, and even more bulky articles of freight and passengers, may be transmitted from one part of the country to another at a speed far surpassing that which has heretofore been attained by any known method of transportation and at a materially diminished cost. The plunger and cars may be fitted with wheels or friction slides, if desired, and made of wood or other light substance, so as to prevent friction."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1852, December 14.—N° 1048.

BELL, JAMES.—"Improvements in railway chairs."

"A compound railway chair (cast or made in one piece) having the form of two ordinary chairs connected by an intermediate portion of such a form as to fit to and support the bottom and also both sides of the rail or rails placed within it. This compound chair is more particularly applicable as a joint chair; and when so used the ends of the two rails are slipped through the chairs into the hollow part of the intermediate portion; when used as a chair for supporting a rail at any other part than at the end, the rail may be passed entirely through the chair to the extent which may be requisite. The rail or rails supported by the chair are secured by keys, or otherwise, in the usual manner within the jaws at each end of the compound chair. The joint (if any) being in or near to the centre of the intermediate portion, the ends of the rails will be so confined and supported that they cannot be easily displaced."

[Expired 7th year. Printed, 6*d*. Drawing.]

A.D. 1852, December 14.—N° 1052.

IRLAM, William.—" Improvements in railways."

" Firstly, the construction of turn-tables, the points of novelty " thereof consisting in placing the rollers upon which the apparatus " runs within brackets or supports attached to or formed upon " the metal parts of the table, which rollers travel therewith upon " rails situated below; also in the adaptation of a screw apparatus " which when desired may be brought into operation so as to " lift the table from a solid bearing upon which it rests in order " to facilitate its being turned. Another point of novelty consists " in a method of constructing turn-tables of wrought iron; this " is effected by placing bars crosswise to each other and uniting " them by angle pieces or otherwise, which bars are not supported by the usual continuous circular rail.

" Secondly, my improvements consist in a method of causing " switches to return to a determined position; this is effected " by means of a spring instead of employing the levers and " weights commonly used for the purpose."

[Expired 7th year. Printed, 8*d.* Drawing.]

A.D. 1852, December 15.—N° 1071.

DUNN, Thomas, GREAVES, Hugh, and WATTS, William, jun.—" Improvements in machinery and apparatus for altering " the position of engines and carriages on railways."

" First, in improvements applicable to the machinery known " as low shelved railway traversers whereby the points or inclined " planes up which the engines or carriages ascend are made " self-acting and self-retaining. Secondly, in improved combinations of machinery to be used in place of railway turn-tables " whereby the engine or carriage to be turned is reversed by " hydraulic pressure, or by mechanical agents acting on a swivel " frame by which the engine or carriage to be turned is elevated " by the flanges of its wheels. Thirdly, in improved combinations of machinery to be used for moving railway engines or " carriages laterally from one line of rails to another or for turning " them by means of bearing bars elevated by hydraulic pressure " or other power acting on the axis of the engine or carriage to " be moved. Fourthly, in improved combinations of machinery " to be used in place of railway turn-tables, whereby the engines

" or carriages to be turned are elevated by bearing bars acting " on the axles, the said bearing bars being put in operation by " hydraulic pressure or by mechanical agents. Fifthly, in an " improved combination of machinery for moving engines or " carriages from one line of rails to another, consisting principally " of a truck or lorry or low shelved traverser which vibrates from " a fixed centre. And lastly, in an improved swivel turn-table, " particularly applicable for moving engines and tenders where " there is not sufficient space for a turn-table of the ordinary construction."

[Expired 7th year. Printed, 1*s*. Drawings.]

1853.

A.D. 1853, January 6.—N° 39.

NEWTON, WILLIAM EDWARD.—(*A communication.*)—"Improvements in the construction of bearings or steps for shafts, " turn-tables, or moveable platforms, which inveution he denominates 'Parry's improvements.'" "A series of rollers made in the " form of double frustrums of cones united at their bases and " adapted to run in grooves of nearly corresponding form made in " the surfaces between which they are interposed.

"The inner frustrums of the rollers, and the corresponding " parts of the surfaces of the grooves between which they are " interposed, are made on bevels proportioned to the diameter of " the rollers and the grooves in which they run, such as would " represent the pitch lines of bevel cog-wheels of the same proportions. This will ensure the rolling of the rollers about a " common centre without slip; and to prevent the said rollers " from being edged outwards, or forced out of their proper paths, " the outer ends of the rollers are made of reversed frustrums, " with the surface of the grooves of nearly a corresponding bevel, " so that when the rollers are in place between the two surfaces, " they (the surfaces) shall be in contact with the inner frustrums, " of the rollers throughout their length; but the said surfaces, " instead of being in contact with the outer frustrums, deviate " a little from it; by which combination the rollers are prevented " from being forced out of their true path, and hence will roll

" around and bear the weight on the surface of the inner frustrums, " thus avoiding the practical objections to the methods heretofore " tried."

[Expired 7th year. Printed, 6*d.* Drawing.]

A.D. 1853, January 7.—N° 44.

DE BERGUE, Charles.—" Improvements in the permanent way " of railways." " The invention relates to permanent way formed " of cast iron chairs and flat bottom or bridge rails and wood " sleepers break:—

" Firstly, in making the chairs with holding clips or snuggs, so " formed and placed upon them as to take hold of or clip both " sides of the lower part or bottom flange of the rail when the ends " of the chairs are horizontally movedor shifted in opposite directions, or when one end only is horizontally moved or shifted.

" Secondly, in forming such chairs with shoulders or recesses " perpendicular or nearly so, to form bearings for the keys for " fastening the rail in the chair.

" Thirdly, in fastening the rail in such chair by means of keys " driven perpendicularly or nearly so, and so as not only to " fasten the rail in the chair, but to be held by the sleeper which " carries the chair.

" Fourthly, in casting chairs with one clip or snugg at one end " and a shoulder at the other, and securing the rail to the " same (the chair) by means of separate adjustable clip or " holding piece, and by one or more bolts and nuts, which " fasten the chair rail and adjustable clip firmly together."

[Expired 3rd year. Printed, 8*d.* Drawing.]

A.D. 1853, January 7.—N° 48.

STEWART, George.—" Improvements in railways, and in the " propulsion of engines, carriages, and other vehicles thereon." " The invention relates to the so arranging the rails of railways, and the wheels of the locomotive engines and carriage " at work thereon, that such rolling stock may be taken up " and down inclines with greater safety and security than at " present, whilst superior facilities are afforded for stopping the " movement of such rolling vehicles at pleasure, and for enabling " the locomotive to start with a train without serious risk of " slipping on the rails.

"These several ends" are accomplished "by indenting or forming teeth on the flanges of the engine or carriage wheels for " gearing with similar teeth or indentations on racks, either laid " alongside the permanent rails or forming part of such rails. " Such teeth may be of various shapes and sizes to suit the varying " gradients of the line and shapes and sizes of the bearing rails " and wheels."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1853, January 17.—N° 112.

YORSTON, ALEXANDER.—(*Provisional protection only.*)—"Improvements in the construction and arrangements of parts of " railways." "The invention relates to the construction and " arrangement of the points or switches of railways (as used " for directing the passage of the trains) in conjunction with " a signal apparatus in such manner that these railway details " shall work much more safely and satisfactorily than at present. A short shaft is laid beneath the line of rails in a horizontal direction and at right angles to the line of points or switches. " This shaft is capable of traversing in suitable guides, and at " each line of shifting rail it has a pair of lugs or projections " standing up one on each side of the rail, so as to hold the siding " rail and switch rail from opening on the passage of a train. One " projecting end of this shaft has upon it a curved lever carrying " at its upper end a signal disc, which answers at the same time " as a weight to keep the shaft so set that its lugs will always be " vertical to retain the rails, this effect being accomplished by the " bearing of the weight over to one side in consequence of the " bend near the lower end of the lever. A lamp may also be " attached in this disc lever. By this arrangement, whenever " this lever stands upright, the lugs take up a similar position " and hold the rails, so that the points cannot possibly spring, " neither can the signal lever be elevated to indicate 'safety' " or closed points when the points are open or partially open, as " the inside lug is left long enough to catch the under side of " the rail under such circumstances, and thus hold the shaft from " turning and the lever from being raised. Hence the engine " driver always knows how the points are when at a considerable " distance from them, and he is independent of chance mis-setting " of the points by an attendant."

[Printed, 4*d*. No Drawing.]

A.D. 1853, January 31.—N° 247.

PERKS, Samuel.—" Improvements in the mode of constructing " certain works applicable to aqueducts, viaducts, railways, " canals, rivers, docks, harbours, light-houses, breakwaters, " reservoirs, tunnels, sea walls, embankments, submarine foundations, and other useful purposes."

" A peculiar mode of constructing timber bridges for roadways, " &c., which is effected by means of combining together a " quantity of boards or thin planks edgeways in a vertical position. " The first thickness of such boards or planks consists of what are " termed bearers, being plain boards on their edges set one over " the other of any required depth, according to the span or opening and the supposed weight such structure will be required " to carry, and such boards to have their joints broken all through " as far as possible. The second row or thickness are termed " binders, and secured to the first row at an angle of about " forty-five degrees, the third row (*videlicit*) bearers are arranged " similar to No. 1 row, only as far as possible break joint with " them; No. 4 row (*videlicit*) binders are fixed also at an angle " of about forty-five degrees, but in the opposite direction to the " angular binders in No. 2 row; and so continue on with as many " thicknesses as may be required, either to construct the bridge, " &c., in one solid mass the whole width of such bridge, or in " separate beams for supporting a platform of flooring on joists " upon them. The next part of the invention consists of forming " beams or bearers for any required purpose upon the same " principle as above named, only using plates of wrought iron, " either galvanised or otherwise, instead of wood, as aforesaid, in " two or more thicknesses set edgeways quite close upon each " other, and laminated, so that the fibres of the iron may cross " in any required direction, and well secured together by rivet, or " screw bolts and nuts. And a novel mode of forming arches for " bridges in cast iron instead of ordinary stone work, and for " which hollow iron cassions are substituted either in a transverse " horizontal direction, in the form of radial blocks, all pertaining " to their centre or centres respectively, or else vertically with " similar radiating tendencies, and the whole of which are " constructed either with plain exterior surfaces or with projecting " ribs or lugs and grooves, or mortices or dovetails, in order to " affording stops or catches for the purpose of preventing any

" slip of either of such blocks from the ring of arch, as is " frequently the case with heavy stone arches; and where required, " it is further secured by means of screwed bolts and nuts, or " cotter pins, rivets, or catches through each other, and which " can be secured by means of hollows through them.

" The next part consists of a novel mode of constructing traffic-" ways for crossings over railways, canals, and such like places, " or dangerous crossings in very crowded thoroughfares, &c., " by means of light framing which is formed into ribs of an " arched curve, or nearly flat curve, or nearly flat on the laminated " diagonal principle, either of iron or wood or combined, and " of open work when required, and employ therewith suitable " angle or T iron to afford stability and rigidity."

[Expired 3rd year. Printed, 8*d*. No Drawing.]

A.D. 1853, January 31.—N° 267.

HADLEY, Charles.—" Improvements in the construction and " formation of granite and stone pavements and surfaces for " carriage and railways."

" The invention in the first part is to be carried out by forming " separate blocks of granite or wood into solid plates or blocks, " of any size, depth, shape or areal section, by the introduction " and application of metal plates, frames, or boxes, the edges or " jointing of which are to be grooved or dovetailed, or of an " angular, semicircular, square, or any other form or section, " or on the stud and plate principle; the foundations of the " road being made solid previous to the plates, frames, boxes, " or blocks being laid thereon in gravel or suitable concrete.

" The second part refers to the application of the blocks of " pavement as or in lieu of sleepers for rails, and in some cases " forming the permanent way or rails for railways; and also to " an improved form and arrangement of rails or grooves, whereby " curves of considerably less radius may be made and used upon " rail and tram roads and ways, and also for the facility of laying " down and using railways in or along ordinary (and zig-zag " streets) and roads.

" By means of the improved rails or grooves, trains or vehicles " may pass thereon with greater facility, speed, and safety to life " and property, and with less friction or straining of any part of " such vehicles or the rails, than in ordinary rails.

"It is also proposed to employ the improved rails or grooves in "a triangular or tricurved form, (*i. e.*) three segments of a radius, "or two segments only, branching from and attached to the "ordinary line of rails for the purpose of turning or reversing "engines and carriages or trains of carriages thereon in lieu of the "ordinary turn-tables."

[Expired 3rd year. Printed, 10*d.* Drawings.]

A.D. 1853, February 1.—N° 270.

CLARKSON, Thomas Charles.—(*Provisional protection only.*) —"Improvements in giving elasticity to certain structures and "parts thereof."

"In stone is cut or otherwise made a hole of sufficient size to "admit of elastic material and chair for a railway sleeper, which "removes the present wear and tear, and the injurious effect from "vibration. A concrete or cement sleeper is moulded to the "required shape and size, at the same time leaving a hole for the "reception of the elastic bed and chair; the flange on the chair "prevents the possibility of its moving from its proper position. "This sleeper will greatly economise the present heavy expenditure, "also prevent the danger now existing on the present plan of the "rails. The elastic material in combination for sea walls, "fortification, common roadways, and beds of iron girders, will "remove the present evil, which vibration and force now so "ruinously acts."

[Printed, 6*d.* Drawing.]

A.D. 1853, February 7.—N° 330.

ROMAINE, William.—"Improvements in rendering wood "more durable and uninflammable."

"The invention consists of a new mode or process of treating "and preparing wood, whereby it is rendered as durable as stone, "and retains its tenacity for a greater length of time than wood "as hitherto prepared, and may also be rendered uninflammable."

The process is described in the specification.

"This mode of treating and preparing wood is particularly "adapted for railway sleepers, piles for dock work, and other "similar works."

[Expired 3rd year. Printed, 4*d.* No Drawing.]

A.D. 1853, February 17.—N° 412.

ADAMS, William Bridges.—"Improvements in railways." The patentee says, "Whereas the mechanical efficiency of the per-"manent way of railways requires that the rails be strong, "vertically and horizontally, to resist vertical pressure and lateral "shocks, and prevent deflection, and that the upper surface of the "rails should be kept as low as practicable on the sleepers to "diminish unsteadiness, and that the accurate distance or guage "between the rails should be maintained, and that the rails should "bear on such a surface as will not tend to damage them by blows "or percussion of the wheels, and will be of sufficient area to "sustain them; and that the joints of the rails should be so firm "as to make them resemble as nearly as possible a continuous bar "or bars, with the wearing surface as hard and solid as may be "practicable. My invention in its various parts is calculated to "effect these objects, and the parts of the invention may be used "separately or in combination, that is to say, the better securing "the guage of rails on railways; the lowering the total height of "the rails above the sleepers, the rails being secured either in "metal or timber chairs or beds, and efficiently connected by "fastenings at the joints, and the rails being in one or more parts "and hardened, if required, on the surface; giving greater depth "to the rails to prevent deflection; and lowering the rails by "making central steps in the chairs, and bedding such chairs by "grooving them in the sleepers to the guage of way, or by using "metallic or timber brackets instead of chairs, or longitudinal "timbers bolted laterally to the rails bedded into cross sleepers; "and also machines to prepare the timbers."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1853, February 17.—N° 413.

MURPHY, James.—"Improvements in the permanent way of "railways."

"The invention consists of certain appliances of improved cast "or wrought iron bearings for supporting all kinds of rails for "railways. The rails and bearings or appliances are to be laid "on or in the ballast of the roadway, and not dependent upon "what are ordinarily termed sleepers for their support or founda-"tion."

[Expired 7th year. Printed, 10*d*. Drawings.]

A.D. 1853, March 16.—N° 651.

WILD, **Charles Heard**.—" Improvements in fishes and fish " joints for connecting the rails of railways."

" Firstly, the constructing fishes for connecting the rails of " railways with a groove adapted for receiving the heads of the " bolts or rivets employed for securing such fishes, and the " application of such fishes for connecting the rails of railways.

" Secondly, the constructing fish joints for connecting the rails " of railways by means of fishes applied to the joints of divided or " split rail.

" Thirdly, the constructing fish joints for connecting the rails of " railways with fishes, secured by three or more bolts and nuts, " or rivets, of which the central bolt or bolts, or rivet or rivets, is " or are of greater diameter than the extreme ones.

" Fourthly, the constructing fish joints for connecting the rails " of railways with grooved fishes fitted to the sides of the rails " and secured to them by bolts and nuts, or rivets, and having " projecting wings firmly secured to and resting upon the sleepers " or bearers so as to support the rails by their sides and upper " flanges.

" Fifthly, the constructing fish joints for connecting the rails of " railways with rails and fishes having the touching surfaces of " one or both of them planed."

[Printed, 1*s*. Drawings.]

A.D. 1853, March 22.—N° 701.

JOHNSON, **William**.—(*A communication.*)—" Improvements " in rolling and shaping malleable metals."

" The invention relates to a novel system of rolling or shaping " various malleable metals, and bears more especially upon the " manufacture of wrought iron into railway wheels and wheel " tyres, railway bars, cylinder and valve covers, boiler ends or " heads, as well as flat plates, discs, and cones. This invention is " applicable to the construction of articles of rectilinear form, " such as rails or angle iron. In this case the rail, for example, is " first formed as a ring by means of machinery similar to that " herein-before described, after which it is cut open at one side, " and then straightened by passing through rollers or otherwise."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1853, March 29.—N° 755.

PYM, JOHN.—“ Improvements in the permanent way of rail-
“ ways.”

The patentee says, “ I construct my sleepers (which are transverse
“ sleepers) of earthenware, slate, stone, or other suitable material,
“ and of whatever material they may be made, I form them
“ hollow, instead of solid as heretofore; and in order to prevent
“ what is termed sopping. I perforate the bottom or sides, to
“ allow the water to enter the interior chamber thereof, and to
“ run off at either end. To fix the chairs upon the sleepers where
“ not desirable or practicable to adopt the methods now in use, I
“ form the sole of the chair sufficiently long to overlap the sides
“ or edges of the sleeper, and secure the ends of the sole by passing
“ a bolt from side to side through the sleeper, and fastening the
“ same by a nut, pin, or rivet.

“ To prevent the jarring of the chair and sleeper I place wood,
“ felt, or other suitable material, between the chair and the
“ sleeper.”

[Expired 3rd year. Printed, 4*d.* No Drawing.]

A.D. 1853, April 4.—N° 804.

MAY, CHARLES.—“ Improvements in machinery for manufac-
“ turing and rolling iron.”

“ This invention consists of improved machinery for rolling iron
“ and improvements in the arrangement of known machinery used
“ for this purpose; and although the invention is applicable to
“ rolling iron for various purposes, yet, as it is peculiarly applicable
“ to the making of railway bars, and more especially of that kind
“ of rails known as the Barlow rail.

“ An arrangement by which the rollers are driven alternately in
“ opposite directions, and that, without any reversing of the
“ machinery, the pile or rail may be passed backward and forward
“ through the rolls, and be elongated in both directions without
“ the necessity of lifting it over the roll, as required in mills of
“ the ordinary construction; also the arranging of a series of pairs
“ of rollers, placed at a distance apart, in such manner that the
“ iron may not be between two pairs of rolls at the same time, yet
“ that the succeeding pairs of rolls be so near as to receive the
“ iron immediately it has quitted the preceding pair of rolls.”

[Expired 7th year. Printed, 6*d.* Drawing.]

A.D. 1853, April 8.—N° 846.

MOSELEY, WILLIAM.—"A new method of railway traction, to "be called a pony railway."

"The invention has reference more particularly to lines of rail-"ways the limits of whose length are such as will enable the "carriages or traines running thereon (where a single line of rails "is employed) to make the journey to the terminus opposite to "the one started from and back again in as short a time as the "interval between the starting of the trains. In carrying out the "system two or more tubes" are employed, "known as atmo-"spheric tubes, laid parallel to and between the rails, for the "purpose of supplying traction power to the carriage or carriages "composing the train, one such tube being in course of exhaustion "whilst the other is employed in the propulsion of the train, so "that on its arrival at the termination of the line it may be set in "motion on the back journey without being turned round or re-"moved from the rails, the connections of the carriages with the "tubes having been previously shifted from the tube just used to "the one which in the meantime has been exhausted. On shifting "the 'connection' from one tube to another the connecting rod "is raised by a screw or lever from the socket, it is then moved "by a second screw, or by a sliding bar and blocks, or by a "lever or levers, to a position immediately over the similar "socket of the coulter of the piston in the tube by the atmo-"spheric pressure in which it is desired that the carriage should "be propelled. The connecting rod is then lowered or dropped "into this socket and secured therein; the carriage is then ready "to be propelled in the opposite direction without being turned "or removed from its position on the rails."

"Where intermediate stations are necessary, two other separate "lines of tubes are laid down for the traffic of each of such "intermediate stations; these tubes are continued to the terminus "in either direction from the station. The carriages or trucks "for conveying passengers, goods, &c. to these intermediate "stations run upon the same rails as the through carriages, "and are arranged in the same serial order as the stations at "which they are to be dropped. For the purpose of expediting "the taking up and setting down of passengers, &c., the car-"riages are liberated from the train, at their respective stations "without impeding the progress of the general line of carriages."

[Expired 3rd year. Printed, 4d. No Drawing.]

A.D. 1853, April 21.—N° 962.

CARR, HENRY.—" Certain improvements in the construction of " railways."

" Firstly, forming the inner part of the wing rails of railway crossings solid instead of with an overhanging flange, as in ordinary " crossing of I-formed rails," with " a filling piece between the " upper and lower inner flanges. This filling piece prevents the " splitting and shearing of the upper flange of the rail; where the " edge of the wheel bears upon the overhanging part it may " be welded to the rail, or the rail may be rolled, or otherwise " constructed of the sectional form of the ordinary I-rail and " filling piece combined. The filling piece is continued to the " part of the rail where the wheel first takes its bearing, or as " far as it is found to be necessary.

" Secondly, in strengthening the middle and overhanging flanges " of the point or point rails, by the introduction of the filling " piece above described."

" Thirdly, in constructing the two middle chairs of a railway " crossing (commonly called the B and C chairs) in such manner " that the whole of the rails, when placed in each chair, shall " be wedged up by driving in two wooden keys, for the purpose " of giving solidity to the point or rails in the chair, and avoiding that motion which causes them to work loose; and for " preventing the rails rising from the chairs, there is a fillet " cast on the distance piece, and also a fillet formed on the loose " block, which fit into grooves or mortices made in the wing and " point rails."

[Printed, 8*d*. Drawing.]

A.D. 1853, April 27.—N° 1014.

GALE, JOSEPH WALTER.—" Improvements in the permanent " way of railways." " The improvements consist in the employment of certain materials, consisting of clay or compounds of " clay with other substances of harder nature containing quartz " or other silicious materials, for the purpose of manufacturing " railway sleepers, by the use of which substance sleepers can " with great facility be manufactured of various forms and " in one or more parts, the materials being of a nature to resist " the action of natural decay or corrosion for a considerable period.

" The use of these substances will also involve the adoption of " improved chairs and method of fastening chairs or rails, part of " which may be applicable to ordinary sleepers.

"The chair employed for holding the rails is attached to the " sleeper by means of screw bolts formed with stirrups for the " reception of a bar of iron, which serves as a tie bar to preserve " the guage of the line; one of these bolts serves to fasten the " rail by keeping a metal jaw in close and firm contact with its " side, thereby obviating the use of keys or wedges.

"A second form of chair is fitted with a pair of lugs which " clip the sides of the sleeper, being secured thereto by a transverse " cottar or key. The chair is formed of two distinct pieces " or cheeks fitting one into the other, and the rail is held " between them by driving up the cottar before mentioned."

There is also "attached to the first form of chair, or any other " form of chair to these sleepers; or if no chair is employed, " then the rail may be attached by the employment of lead, " which is run into a cavity left in the sleeper for that purpose, " either round a bolt with a ragged end and with a thread cut " in the upper end, fitted with a nut; or it may be run in first " and hole bored into it for the reception of the screwed end of " a bolt which has a head formed on the upper end and passes " through the chair or rail, thereby effectually securing the same " to the sleeper by screwing it up. The cavity is made larger " at the bottom than at the top, to keep the lead securely in its " place. Either of these chairs may be employed with other " sleepers, the ends of the bolts in the first arrangement being " screwed or not as found necessary, or trenails may be substituted " for them."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1853, May 13.—N° 1180.

ARROWSMITH, JOHN.—(*Provisional protection only.*)—" A " new or improved turn-table."

"The invention consists of a hydrostatic or floating turn-table " constructed in the following manner:—Two wrought-iron " basins" are made, " one of somewhat larger size than the other " the larger one is firmly imbedded in masonry on the ground " and the smaller one is placed therein and floated by means of " water placed between the two. The said basins are made of

" wrought-iron plates, after the manner in which steam boilers " are made. The inner floating vessel is closed at top, and the " rails are properly arranged thereon; the larger basin is furnished " with an inlet and an outlet pipe, so as to regulate the quantity " of water to suit engines and tenders of different weights; and " the inner or floating basin is provided with rollers working " between angle irons affixed to the outer basin so as to limit " the height to which the said floating basin rises on the removal " of the weight of the engine or other body. The said floating " basin is also provided with an apparatus for fixing the same " during the passing off of the weight."

[Printed, 4*d*. No Drawing.]

A.D. 1853, May 4.—N° 1099.

WALKER, JAMES.—"Improvements in turn-tables used for " railway and other purposes."

The invention consists in a re-arrangement of and additions " to turn-tables, by which they are rendered what is termed self- " acting, the motive power for the purpose being obtained from " the gravity of the object (a locomotive or other vehicle for " instance) to be turned when placed upon the table descending " from the level at which it passes on to the table to a lower one " where it passes off. It is accomplished, first, by inclining the " paths upon which the wheels or rollers of the table travel " sufficient to cause the table to revolve or run down by gravity; " second, by employing a weight sufficient to balance the table " on the incline and to overcome the friction so as to bring the " table back to its highest position, when it is free to return; " third, by employing two sets and levels of rails, the high level " to pass on to the table and a low level to pass off after the " vehicle has been turned. The rails of the table when at their " highest level may be made to form part of a permanent way " passing across it, and when at its lower level the continuation " of a way branching into the permanent way at each side of " the table through self-acting joints. With a turn-table thus " arranged it will be seen that if a weighty object be placed upon " it the balanced state of the table on its inclined path will be " destroyed (provided the increased gravity is sufficient to over- " come the friction, and the addition to the balance weight for the " purpose of bringing the table to its highest level) and the table

" will descend and turn by reason of the wheels or rollers running " down their inclined paths."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1853, May 19.—N° 1245.

DE BERGUE, CHARLES.—"Improvements in the permanent " way of railways and also in chairs and sleepers for permanent " way."

"Firstly, of an improved mode of securing a rail to a chair " (whether of wrought or cast iron) and the chair to a sleeper " by means of one bolt, screw, or other fastening, and an adjustable clip or holding piece.

"Secondly, of an improved mode of securing a rail to a chair " (whether of wrought or cast iron) and the chair to a sleeper " by means of two bolts, screws, or other fastenings placed on " one side of the rail and an adjustable clip or holding piece, or " two if preferred.

"Thirdly, of a improved mode of securing chairs to sleepers " having notched or shouldered chair seats or beds by means of " one bolt, screw, spike, trenail, or other fastening.

"Fourthly, of an improved mode of making chairs with a stud " or projection from the under side to assist in preventing the " chair from shifting or moving on the sleeper.

"Fifthly, of an improved mode of making wrought-iron chairs " for permanent way, having bended clips or holders, by setting " or bending up the clips or holders and also setting or bending " up shoulders or projections without turning over or bending " back those parts of the metal which form the bended clips or " holders and projections.

"Sixthly, of an improved mode of making chairs for permanent " way with one hole or opening only for receiving one bolt, " screw, or other fastening, or with two holes or openings, both at " one end of the chair for securing the same to a sleeper, and " also when preferred for also securing the rail in or upon such " chair.

"Seventhly, of an improved mode of making chairs which have " a holding clip only, or a holding clip and shoulder, by first " rolling a bar of wrought iron with an upright raised rib or ridge " (and also with a smaller rib when a raised shoulder is required), " and afterwards bending or setting such upright rib or ridge

" to an angle so as to form it into a holding clip. Or by rolling " a bar of wrought iron of such an angular form and with raised " ribs or flanges of such shape that when the bar is afterwards " flattened one rib or ridge will form an angular holding clip " and the other a raised shoulder; or, when a second rib is not " required, the forming a sunk shoulder by a recess, groove, or " indentation."

[Expired 7th year. Printed, 1*s.* 4*d.* Drawings.]

A.D. 1853, June 7.—N° 1400.

DAVIS, THOMAS, BLOOMER, BOAZ, and BLOOMER, BOAZ, jun.—(*Complete Specification, but no Letters Patent.*)—" Improve-" ments in the manufacture and piling of iron, to be used in the " production of railway chairs."

The "invention consists, firstly, in rolling lengths of iron " intended for the manufacture of railway chairs in separate bars " or strips and afterwards combining and piling them in such " manner as from the arrangement of the fibre of the metal to " ensure greater strength.

"The manufacture is as follows:—The lips, or those portions " of the bar intended finally to form the lips, of the chairs are " first brought into a form closely assimilating in section the " form required for this part of the chair by passing the iron " between grooved rollers. These bars are then placed on one " or more flat rolled bars of iron, and the whole having been " re-heated is again drawn through grooved rollers, by which the " iron is welded together. The remaining operations being the " same as those now practised in making rolled railway chairs."

[Printed, 6*d.* Drawing.]

A.D. 1853, June 13.—N° 1427.

SMITH, WILLIAM HENRY.—" Improvements in the permanent " way of railways."

"It consists in the adaption and application thereto of a form " of rail or a bearer for rails which admits of the rail or bearer " being imbedded in the ballast, and constituting a firm line of " railway without the use of the ordinary sleepers, by means of " the vertical and lateral rigidity which such form presents. The " rail may be applied to sleepers of the ordinary construction.

“The form of rail or bearer thus referred to is such as to constitute in the cross section, at intervals, a central vertical “ support with lateral supports between such intervals. These “ lateral supports occur alternately on either side of the vertical “ supports in such a manner as to form in combination there- “ with a continuous undulating line on the under surface of the “ rail or bearer. They are also formed and arranged in such “ a manner as to leave hollow spaces in which the ballast may “ be packed, so as to afford much firmness to the line.”

[Expired 3rd year. Printe , 8*d*. Drawing.]

A.D. 1853, June 25.—N° 1548.

ANDRAUD, Antoine.—“Certain improvements in railways “ and locomotives running thereon, which improvements facilitate “ the ascension of steep incline.”

“ The rails rest on two ‘sleepers,’ united by an iron band or “ simply by a plank. On these sleepers are fixed the counter “ rails, a kind of thick plank of soft wood to give elasticity, “ and covered by hard wood planks prepared to receive the action “ of the striated band. The striated band and the counter rails “ are only worked when their intervention is necessary; wherever “ the natural adherence of the driving wheels is sufficient the “ counter rails are dispensed with and everything works in the “ usual manner, but when the incline of the road requires it the “ counter rail, encountered by the striated band, comes to the “ aid of the driving wheels, and the incline, however great, is “ surmounted. A slight portion only of the weight of the engine “ bears on the counter rail, which, protected by the iron rail, “ receives a pressure only just sufficient to cause the striated band “ to bite or the rail. For straight inclines the counter rail may “ be established both sides of the way, and for inclines curved at “ a small radius the counter rail may be placed on the outer side “ only. The counter rail planks should be preserved with pitch, “ or otherwise metallized and covered, as best adapted to render “ the adherence of the striated wheel as strong as possible.”

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1853, June 29.—N° 1573.

WRIGHT, Lemuel Wellman.—(*Provisional protection only.*) —“ Improvements in the permanent way of railways.”

"The peculiar construction of rails and sleepers, and in the " manner of fitting them together so as to maintain the parallel- " ism of the lines of rails, and also in the mode and manner of " adjusting the rails with facility so as to keep a uniform level. " The T-shaped rails are so laid and fixed as to have their ends " meet on sleepers where no joints of the permanent longitudinal " chairs occur.

"The rails being placed upon the tranverse sleepers will be " found to possess a certain amount of elasticity which will tend " to counteract any shocks to wheels, rails, axles, and to the " rolling stock generally. By this construction of permanent way " it will be found that the rails will be laid and remain as firm, " compact, and straight as if they were continuous solid rails."

[Printed, 6*d.* Drawing.]

A.D. 1853, July 8.—N° 1624.

DANGERFIELD, BENJAMIN, and DANGERFIELD, B., Jun. —(*Provisional protection only.*)—"Improvements in constructing " and fixing the rails of railways."

" The rail, the upper part of which has the form of the ordinary " rail; the lower part is formed of a longitudinal rib, which " said rib enters and fills the space between the longitudinal " ribs formed on the base plate; pins pass through the ribs and " fasten them together; the pins are secured in their places by nuts.

"It will be seen the junction of the rails occurs at the middle " of the ribs, on the bed, and similarly the junction of the rail " occurs at the middle of the rail, (the rails and ribs are repre- " sented much shorter than is proportional in order to represent " the junctions of the said ribs and rail, and the pins are con- " sequently too close in the same proportion, the rails are of the " ordinary length). The base plate may be affixed to a suitably " formed chair, or the said base plate itself may be sufficiently " wide to be attached to the wood or stone constituting the bed " of the railway."

[Printed, 6*d.* Drawing.]

A.D. 1853, July 18.—N° 1708.

DE FONTAINE MOREAU, PETER ARMAND LE COMTE.— (*A communication.*)—" A new mode of equilibrating indefinitely " the weight of atmosphere," "The apparatus is composed of a metallic cylinder in which " compressed air is confined between the piston and the end. " A pressure or elastic force is produced within the space of " the cylinder equal at least to one atmosphere, by bringing " the piston to the extremity of the cylinder, which result is " obtain either by employing a steel spring of a suitable form " and strength or by introducing within the said space air " sufficiently compress to overcome the friction of the piston " and cause it constantly to press against the part. To charge " the cylinder with compressed air."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1853, July 30.—N° 1780.

DOUGLAS, George Katz.—" Certain improvements in the " permanent way of railways."

" The invention consists in improvements in constructing " railway chairs, and in jointing and securing rails in railway " chairs."

" The chair is made with two pairs of jaws, which are cast " together in the usual manner, and are sufficiently wide apart at " the top to admit the rail. Between the jaws and the body of the " rail is a plate; this plate is swelled out between the jaws in " order to strengthen it, and the plate is held in contact with the " other side of the rails by vertical gravitating wedges. These " plates and wedges are made of cast iron or wood. When the " wedge is made of wood it is requisite to have a hole in the chair, " through which the wedge can be forced when the rail has to be " removed. The sides of the wedges are rounded, and the jaws " and plate are recessed; by this means the plate and wedges are " held in their proper positions."

" Also a mode of holding the common bridge rail in a chair. " The chair is made with a projection, fitting into the rail to hold " it laterally. The vertical gravitating wedges may also be em- " ployed in securing the contractors and bridge rails in their " chairs by making the jaws and the plates or blocks of suitable " shape."

" The above-described improvements in railway chairs are also " applicable to those chairs that are cast with the sleepers."

[Expired 7th year. Printed, 8*d*. Drawings.]

A.D. 1853, August 1.—N° 1793.

PERRING, John Shae.—" Improvements in the permanent " way of railways."

" The invention relates to an improved form of that part of " the permanent way of railways called points or switches, and " consists in so forming the rails which constitute such apparatus " that they can be turned over and used on either side, (that is to " say) the two moving or tongue rails are cut or otherwise formed " to a pattern which will admit of their being adapted either side " up, so that when the one surface is worn out the other may " be brought upward forward for the carriages to run upon, " and in like manner the fixed rails are constructed which constitute the other portions of switches."

[Expired 7th year. Printed, 6*d*. Drawings.]

A.D. 1853, August 9.—N° 1855.

BAINES, William.—" Improvements in railways."

" The rails are made with ribs or projections on their sides, " and at right angles or nearly so to the sides, to receive the " fish joints will offer a better support at the crossings; the rails " which come together at an angle or from the point are made " similar in form at their under surfaces to what they are at their " upper surfaces, so that when worn on their upper surfaces " they may be turned over and their under surfaces made the upper " ones, by which a considerable saving will result in making " those parts of a railway where there are crossings; and in " order to fix the rails more securely in chairs than heretofore, " and to allow of the rails of a railway to be turned over, and " thus to be used on both sides, each chair is made with a hollow " jaw on one side to receive a filling piece, which will, when a " rail is turned over, adjust for the deficient part of the rail which " is worn away; the other jaw is also made hollow and inclined " to receive a thickness of wood or flexible material, between " which and the rail adjusting metal wedges are used, which in " one form are drawn towards each other and in the other form " they are made to rotate in face of each other, and the faces " being made with steps and incline, the more they are moved " the more strongly they are caused to hold, and the chairs are " fixed to sleepers by clipping blocks of wood, which together

" with the chairs are fixed by treenails which pass into the " sleepers.'

[Expired 7th year. Printed, 6*d*. Drawing.]

A.D. 1853, August 23.—N° 1956.

COWPER, CHARLES.—(*A communication.*)—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

" Rails are to be made consisting of a broad flange, with a central " part projecting above it and a similar projection below it, so that " it may be placed with either side uppermost, and the upper " projection the serves for the wheels of the carriage to run upon, " while the lower projection is bedded in the sleeper or bearer, " or in the ballast upon which the broad flange of the wheel " rests.

" These rails may also be turned end for end or shifted to " opposite sides of the line of way, in order that when one edge " of the rail is worn or injured the other edge may be brought " into its place. When it is not required to invert the rail the " lower part may be of different form from the upper part, " and may be employed for preventing any lateral motion of the " rail on the ballast or support.

" To fit rails upon sleepers or bearers the bottom of the rail is " bedded in a slight recess in the sleeper or bearer, and a block " of wood or iron or other suitable material is fitted to each side " of it, so that one end of each block buts against the side of the " rail, whilst the other end buts against the end of a recess made " in the sleeper or bearer. Bolts and nuts, or screws or other " suitable means, are applied for forcing down these blocks and " thus causing them to grip the rail very firmly between them. " When iron blocks are employed a small key or packing of wood " or other elastic material may be introduced between them and " the rail. In some cases the blocks and rail may be fitted into " a metal plate, which may be itself embedded in or fixed to the " sleeper or bearer."

[Printed, 4*d*. No Drawing.]

A.D. 1853, August 27.—N° 1991.

STIRLING, JOHN DAVIE MORRIES.—" Improvements in the " manufacture of rails and parts of railways and tyres of railway " wheels."

"This invention has for its object the piling certain descriptions "of iron for the purpose of being rolled into bars for the rails of "railways, for switches and crossings of railways, and for tyres "of railway wheels, and consists of piling bars of iron rendered "crystalline by means of tin, antimony, arsenic, or bismuth, with "bars of other iron (combined or not with zinc), to give fibrous "character to the interior and other parts of such compound bars, "the crystalline iron coming to the wearing surfaces."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1853, September 14.—N° 2136.

SPENCER, George.—"Improvements in supporting rails of "railways."

"This invention consists in applying longitudinal bearers of "iron which are corrugated transversely or across in such manner "that the rails, whether fixed directly to the bearers or indirectly, "are supported by the convex parts of the corrugations; and in "some cases wood is combined therewith, or other bearers, below "the corrugated longitudinal bearers of iron."

[Expired 7th year. Printed, 8*d*. Drawings.]

A.D. 1853, September 14.—N° 2138.

SWINGLER, Thomas.—"Improvements in the permanent way "of railways."

"The object of the invention is to simplify and reduce the cost "of labor in the manufacture of switches and crossings; the "principal feature of the invention consisting of an improved "mode of fastening the back rail of a switch, and of forming "a switch so as not to require any manipulation of the back rail, "which cannot be readily done by the rail layer on the railway, "so that a back rail (which wears much faster than a switch) "being worn out on the upper surface it may be turned or a "new one put in its place. For this purpose the rail is fixed "on the outer side by chairs with a wooden key, resembling "ordinary railway chairs, except at the first point of support "from the end of the switch, where the chair is constructed so "as to support the rail on he bottom and outer side only."

"The improved method consists in cutting vertically the "points of the switch to the depth of only the flange of the wheel, "leaving the lower three or four inches of the full width by which

“ the necessary strength of the end of the switch is retained “ without being liable to either of the objections above mentioned.

“Another part of the invention consists of a mode of attaching “ rails to chairs and sleepers by casting them on the rail. The “ side rail of the crossing and back rail of the switch and the “ rails and points, which may be of forged iron or steel, are at- “ tached to the mould or moulds, being heated to the required “ heated; the upper surface of the rails being 1¾-inch or there- “ abouts above the surface of the mould or moulds for the cast- “ iron plate or chair of the crossing or switch.”

“The cast-iron plate is a continuous plate when used in iron “ roads, but for wooden sleeper roads separate chairs are cast on “ the rail, which has a hole drilled or formed in it where the “ chairs occur in order that a more firm connexion may take “ place.

“ It may be advisable in crossings to attach the point alone by “ casting it on the iron sleeper or chair, the side rails being other- “ wise fastened, or the side rail alone may be attached by casting, “ leaving the point to be otherwise fastened.

“ In cast-iron roads the guide or check rail of the crossing is “ formed of cast iron, and cast in connexion with the cast-iron “ sleeper, instead of using a piece of rail fastened in chairs as is “ usually done.

“Sleepers having two chairs cast transversely or four chairs “ (two being transverse and two longitudinal) are used where “ there is not width between the rails for ordinary cast-iron “ sleepers.”

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1853, October 3.—N° 2259.

JEE, Alfred Stanistreet.—(*Provisional protection only.*)— “ Improvements in the construction of rails for railways.”

“This invention consists of making the rails for railways each “ of two parts longitudinally in such mnnner that the bearing “ surfaces are undivided, whereby also the parts may be put “ together so as to break joint, and thus render what is termed “ ‘ fishing ’ or ‘ fish jointing ’ rails unnecessary. For this pur- “ pose the bearing surface of the rails is rolled as heretofore of “ any desired form and undivided, but the portions of the rails “ below the bearing rails are rolled or formed into two parts

" longitudinally, which when laid together form the section of " the rail desired. The parts of which the rails are composed " are fixed by rivits or other convenient manner."

[Printed, 4*d*. No Drawing.]

A.D. 1853, October 8.—N° 2303.

POOLE, John, and KEMP, James Colquhoun.—(*Provisional protection refused.*)—" An improvement in the construction of " railway chairs and railway engine carriage and waggon wheels, " and the mode of manufacturing railway chairs and fixing the " railway bars."

" The removal of the whole or greater part of one cheek or lug " of the present chairs now used upon railways or other tram " roads; the method of fixing the railway bars or tram plates to " the chairs, and an increased diameter or depth of the flange of " railway engine, carriage, or waggon wheels, and the mode or " process of manufacturing railway chairs."

[Printed, 4*d*. No Drawing.]

A.D. 1853, October 8.—N° 2311.

MAY, Charles, and SAMUEL, James.—" Improvements in " joining the ends of the rails of railways."

" The first part of the invention consists in a mode of welding " the ends of the rails used in the construction of railways. " Experience has proved that if instead of forming the line of " rails by short bars placed in chairs and keyed or wedged therein. " The well-known plan of fish jointing to a certain extent accomplishes this; but the object is a more perfect union by welding, " and to accomplish this grooved rollers or tools are arranged " in a portable machine in such a manner that when the ends of " two rails at a welding heat are brought together and are held " stationary the rollers may be moved to and fro and caused to " press more and more on the heated iron, and thus produce " a welding of the parts. The edges or peripheries of such rollers " being turned of the proper form will leave the rail of the right " shape for the wheels to run upon them.

" The second part of the invention has reference to cases in " which it is desired to fish joint the rails of a railway in use. " For this purpose it is requisite to pierce a hole or holes near

" the end of each rail to allow of a bolt or bolts passing through to " attach the fishing plates, usually two holes in each rail, so that " four bolts are used to each fish joint, as is well understood by " engineers; and to pierce these holes and attach the fishing " plates without stopping the traffic or incurring danger to the " trains a machine is adopted that forms at the same time a " drill and a temporary joint chair.

"The third part of the invention relates to the joining the ends " of rails by means of melted metal poured thereon in a mould " surrounding the ends of the bars, the object is so to perform " this process as to prevent the rails from drawing asunder " endwise, which is accomplished by piercing the end of each rail " with one or more holes. If sufficient size to allow the molten " metal to run through and unite the two sides, or put in the holes " a short piece of wrought iron previous to pouring on the metal " which may be riveted up when the mould is removed; these " joints are made so as to come between two chairs or supports " in the same way that fish joints are usually applied, or they " may be of a form suitable to become supports or chairs for the " rails, and we denominate them 'cast on fish joints.'"

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1853, October 10.—N° 2320.

BROOMAN, Richard Archibald.—(*A communication.*)— " Improvements in railway switches."

"The operation of the invention is such that in the case of a " train approaching a switch which has been carelessly left open " or so as to run the train upon a side track, the rails will be made " to adjust themselves by the force of an auxiliary power, as a " spring or weight coming into action before the wheels reach the " switch, the wheels of the locomotive effecting the disengagement " of a bolt by means of proper mechanism placed along the " track and extending a sufficient distance to allow enough " time to elapse for the movement to take place between the " moment the wheels strike the disengaging apparatus and that " at which they come upon the switch rails when under the " highest possible rates of speed. In the construction of self-" acting switches it is important that the parts required to move " shall always be free to do so.

"This is not always the case, because such parts are liable to

" become choked or clogged up by dirt and other like obstruc-
" tions falling upon them, and because also in very cold weather
" the shifting rails and sleepers are liable to become frozen. All
" these difficulties have been overcome by the present improve-
" ments."

[Expired 3rd year. Printed, 6*d.* Drawing.]

A.D. 1853, October 11.—N° 2323.

KEMP, HENRY.—(*Provisional protection only.*)—" Certain im-
" provements in the preparation of wood for sheathing ships
" as a substitute for copper and other metals, also in house,
" ship, and pier buildings, &c., &c."

And for railway sleepers.

[Printed, 4*d.* No Drawings.]

A.D. 1853, October 21.—N° 2437.

LLOYD, SAMUEL.—" Improvements in the construction of
" turntables."

" In the introduction of a toggle or other lever or levers under
" the centre pin or pivot of turntables, by means of which the
" turntable may be raised when required for use, it being so
" constructed that, except while it is raised, the weight is not
" carried on the centre pin or pivot, but on the ring or frame
" at its periphery. By this means, when the turntable is at
" rest it is quite steady and solid, and is not likely to be
" injured by trains passing over it, whereas as soon as the
" centre pin or pivot is made to rise by means of a lever or
" levers under it being worked by another lever or levers in
" connection therewith, the turntable is raised, and may be
" turned with great facility, the weight resting then on the
" centre pin or pivot. Provision is made, as in other centre-
" bearing turntables, for the weight of the table not being equally
" poised on the centre pin or pivot by means of horizontal
" rollers which are fixed round the centre pillar of the turn-
" table, and serve, by their contact with this pillar, to preserve
" the turntable in a level position while rising and while in
" use.

" When the turntable is no longer required, the lever on which
" the pin or pivot had been resting is lowered and the turntable

" brought to its original position, in which it is retained by a " catch or catches."

[Expired 3rd year. Printed, 1*s*. 4*d*. Drawings.]

A.D. 1853, October 31.—N° 2512.

PARSONS, PERCEVAL MOSES.—" Certain improvements in the " switches and crossings of railways."

" Firstly, in making those parts of the wing and point rails of " crossings, and the tongue rails of switches, which are subjected to " the greatest wear, more durable, and in constructing them in " such a manner that the parts when worn out can be removed and " replaced without removing or replacing the whole of the rail. " Secondly, in securing the wing and point rails of crossings " so as to render the points firm and rigid, and prevent any " relative motion between them and the wing rails. The first " part is accomplished by removing a portion of the upper part " of the wing and point rails of crossings and the tongue rails " of switches, at that part most subjected to wear, and replacing " such portions by other pieces of a suitable form, and securing " them firmly to their places by means of bolts, screws, keys, or " wedges, or by dovetailing, wedging, rivetting, or casting such " pieces on to the rails."

" The second part is accomplished by using keys, wedges, blocks, " saddles, or other similar contrivances made to fit in between " the wing and point rails, and made of a suitable form, or having " tongues or other projections to fit into grooves or other recesses " formed in the aforesaid detached portions, or vice versa, or formed " by the said detached portions and the rail jointly; and in cases " where such detached parts are not used, and the wing and " point rails are of a suitable form, by using keys, wedges, " blocks, or saddles made to fit in between the wing and point " rails, so as to bear against the under surface of and support the " upper tables, and to bear against and rest upon the upper " surface of the lower tables of the wing and point rails."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1853, November 4.—N° 2558.

SCOTT, JAMES.—" An improved apparatus for shifting carriages, " waggons, engines, and other vehicles on railways and tram- " ways."

"This invention has reference to a portable apparatus which " may be carried with the engine, or guard's van, so that in " the event of an engine or a carriage being thrown off the line it " may be readily replaced by means of this apparatus in much " less time than the same can be done by the appliances at " present in use, such as screw jacks, crow bars, planks, &c.

"The apparatus consists of two portable rails, which are kept " in their proper positions by two bars, with a knee at one end to " take hold of the permanent rail, and with holes in the other end " to allow the portable rail to extend to any distance that the " wheels of the vehicle may have been projected from the permanent rail when thrown off the same by accident."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1853, November 4.—N° 2568.

JOHNSON, John Henry.—(*A communication.*)—(*Provisional " protection only.*)—" Improvements in the manufacture of malleable iron, which improvements are also applicable to the " manufacture of other malleable metals."

"This invention relates to the manufacture of malleable or " wrought iron and other metal bars to be afterwards used in the " construction of axles, rails, tyres, &c., and consists in twisting " a number of bars singly, and afterwards faggoting them " together to be welded or rolled in the ordinary manner. By " this means a much tougher material is obtained than by the " processes at present adopted. Tyres may also be made of thin " twisted bars arranged in a circle and welded in a piece without " joints, each twisted bar being made to overlap and interlace " with the rest; sheet metal is also composed of these twisted " bars which are afterwards rolled flat and laid crosswise over " each other when the whole are again rolled together, forming " thereby a perfect plate."

[Printed, 4*d*. No Drawings.]

A.D. 1853, November 8.—N° 2595.

SHEPHERD, George.—" Certain improvements in the construction of railways."

" Employing in the construction of railways hollow sleepers or " bearers of wrought or cast iron, or of a combination of wrought

" and cast iron. These sleepers or bearers are made in various forms " and combinations, the section of one form of sleeper, made from " wrought or sheet iron, bent into an angular form with flanges at " the sides, which are rivetted to the piece forming the base; " the bolts which are screwed into a female or double nut to " secure the chair to the sleeper. A piece of india-rubber is placed " between the chair and the sleeper. The top and bottom pieces, " or either of them, may be of cast iron, and rivetted or screwed " together. Another form of sleeper may be" made of " cast iron " cast in one piece, or of wrought iron with the edges lapping " over and welded together, or rolled out on a maundril without " welding. The chair is to be cast to fit the surface of the " sleeper."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1853, November 9.—N° 2597.

DUNN, Thomas, BOWMAN, James, and DUNN, Joseph.—" Improvements in machinery for raising, moving, and lowering " heavy bodies."

The patentees describe fourteen different improvements in traveling jib and derrick cranes, and in the eighth they say, " in " a crane with a radiating jib or shears, the angle of which can " be varied by a worm or worms supported by the shears gearing " into one or two fixed toothed segments, the centres of which " coincide with the fulcrum of the shears; also in giving motion " to the chain barrel by a steam-engine, the piston rod of which " gives motion to the crank fixed to the pinion which works into " the wheel on the chain barrel; this crane may either be fixed " or it may be mounted on a truck or lurry for railway or other " purposes."

[Expired 3rd year. Printed, 1*s*. 8*d*. Drawings.]

A.D. 1853, November 10.—N° 2606.

DE FONTAINEMOREAU, Peter Armand le Comte.—(*A communication.*)—(*Provisional protection only.*)—" Improvements in preventing accidents on railways, also in shifting and " lifting railway carriages."

" Firstly, for enabling the driver of a train to change the line of " rail. Secondly, for communicating along the train. Thirdly,

" for superseding turntables. Fourthly, for moving and lifting " railway carriages."

[Printed, 1s. 8d. Drawings.]

A.D. 1853, November 22.—N° 2719.

BURLEIGH, BENJAMIN.—" Improved railway crossings, as " adapted to the double-headed rail and the ordinary rail and " chair."

" The invention consists of certain pieces of solid metal called " flange bearers being inserted and bolted between the wing " rails, and between the wing and point rails, for giving support " to the flanges of the wheels while passing over them, and thereby " greatly increasing the strength and durability of the crossings."

" Between the wing rails and between the point and wing rails " the bearers (which are to receive and support the flanges of the " wheels at the same time that the peripheries of the wheels " are supported by the rails) are fixed, as shewn in the several " figures;" it is preferred " that these flange bearers should be " made in three parts, and also that they should be fixed to and " between the rails by screw bolts and nuts. The flange bearers " should be made of wrought iron faced with steel, but the " form, the fixing, and the material of the flange bearers may " be varied. The ends of the flange bearers are depressed or " hollowed out, so that the flange may not receive a shock, but " come on them by degrees."

[Expired 7th year. Printed, 8d. Drawing.]

A.D. 1853, November 23.—N° 2730.

KINDER, THOMAS WILLIAM.—" Improvements in the construction of the permanent way of railways."

" The invention relates to an improved construction of rail, " and consists in rolling them first in long and nearly flat " lengths, with a heavier amount of metal n the middle of the " roll; the plate is afterwards brought into the requisite shape for " the rails by suitable rollers; these rails may either be secured " by Norris's patent chairs, cast on to the rail, or by any other " system, the objects of the invention being the substitution " of a hollow rail of equal strength, and of considerable less " expense than the present solid rails."

[Expired 3rd year. Printed, 8d. Drawing.]

A.D. 1853, November 30.—N° 2789.

LOUBAT, ALPHONSE.—(*Provisional protection only.*)—" Im-
" provements in the construction of tramways."

"This invention relates to the application to ordinary roads of
" a rail having a grooved upper surface, such rail being intended
" to serve as a tramway for waggons and other vehicles. The
" rails are set in such a manner in the road as not to project
" above the surface thereof; they will therefore present no ob-
" stacle to the progress of the ordinary traffic. The rail is provided
" with a longitudinal groove of a U or V shape in section, for
" the reception of the flanges of the carriage wheels. These
" improved tram rails, which may be applied either to macadam-
" ized or paved roads, may be bolted in any convenient manner
" to transverse and longitudinal sleepers, in the ordinary manner
" of laying down tramways or railways."

[Printed, 4*d.* No Drawings.]

A.D. 1853, December 2.—N° 2801.

CALLEN, ARTHUR WELLINGTON.—(*A communication.*)—(*Pro-
visional protection only.*)—" An improved excavating and dredging
" machine."

"The invention consists of a machine for excavating earth-
" works in docks, railways, and other cuttings, and for excavating
" under water and dredging the beds of rivers and harbours.

"The excavator consists of a long beam, at the end of which is
" fixed a strong iron scoop or bucket, the back end of which opens
" upon hinges, so as to discharge the material excavated, when it
" closes by its own weight, and when closed the end is held
" secure by strong iron catches and drop bolts. On the under
" side of the excavator beam there is a rack, which works on
" a pinion fixed between the two head beams of the crane, and
" by turning this pinion the excavator is raised or lowered
" according to the depth required.

" To the excavator are attached two strong chains, one of which
" is fixed to the scoop or bucket, and thence passes over the
" end of the crane to the engine, and when the engine is put
" in motion this chain draws the scoop or bucket forward, through
" the material to be excavated, and raises the scoop and beam to
" the proper height.

"When all the material has been excavated within the range of " the machine, it is either moved or floated to the right or left, or " backward or forward, as the case may be, and the operations " before mentioned are again repeated."

[Printed, 4d. No Drawings.]

A.D. 1853, December 2.—N° 2812.

SAUNDERS, JONATHAN.—" Improvements in the manufacture " of rails for railways."

"The object of this invention is to obtain a manufacture of " rails with steel at the wearing surfaces, and the invention " consists of a peculiar means of piling iron and steel, and " rolling the same into railway bars. For this purpose a pile " is formed by means of several portions of bars of blistered " steel laid together on portions of bars of iron, the top and " bottom of the pill being composed of slabs or bars of iron. " This pile is heated and rolled into a long slab, suitable in " dimension for making one or more surfaces of further piles, " each of which is composed of a portion of the slab above mentioned, and two or more layers of iron, the steel being outwards. " These piles are then rolled into railway bars, the steel coming " to the wearing surfaces."

[Expired 7th year. Printed, 6d. Drawing.]

A.D. 1853, December 3.—N° 2818.

ILIFFE, HENRY JEREMIAH, and NEWMAN, JAMES.—(*Provisional protection only.*)—" Certain improvements in the " construction of metallic bridges and other similar structures."

"The improvements consist in manufacturing the various parts " or details required in the construction of such like structures as metal bridges, floors, and aqueducts, and in arranging and " combining those details in such manner that great strength " and resistance is obtained with comparative lightness and " economy in labour and material. For this purpose it is proposed " to employ metallic tubes for every portion of the structure " that will admit of this adaptation. These girders are in section " of the form of elliptical or rectangular tubes, having a flange " or fin top and bottom running the entire length of, and " manufactured at the same time as, the ellipse or rectangle.

" For larger purposes the tubes may be made of plates rivetted " together. These tubes are secured laterally by transverse tubes " passing at intervals through eyes made for that purpose in " the fins, and are further strengthened by short tubes, each of " the length of the distance between the longitudinal girders, " with flanges at both ends; these short tubes are passed over " the transverse girder tube, and each is firmly secured between " the longitudinal girders by being rivetted through the flanges " at the ends to corresponding flanges round the eyes in the " fins of the longitudinal girders; and should it be required to " form a double level bridge for road and railway, the rails for " the latter may be rolled on the fins of the long girders."

[Printed, 4*d.* No Drawings.]

A.D. 1853, December 8.—N° 2853.

BEALL, JAMES.—" Improvements in apparatus for applying sand " to the rails of railways."

" For this purpose the sand is placed in a suitable vessel, the " shape of which may be varied, and from this a tube descends " to near the surface of the rail on which the sand is to be laid, " and in order to regulate the supply of sand a valve is employed " near the upper part of the tube which when down closes the " opening into the tube. The valve is in connection with a " suitable pull or instrument for opening it, and keeping it open " against the action of the vulcanized india-rubber spring."

[Expired 3rd year. Printed, 6*d.* Drawing.]

A.D. 1853, December 31.—N° 3030.

MILNER, JOHN.—" Improvements in connecting the rails of " railways."

" The rails are connected by inserting one or more short pins or " dowels into holes drilled in the abutting ends of the rails. " The vertical and lateral motion of the rails with regard to each " other is thus prevented."

[Expired 3rd year. Printed, 6*d.* Drawing.]

1854.

A.D. 1854, January 9.—N° 45.

BURLEIGH, Benjamin.—" Improvements in railway switches " and chairs."

"This invention has for its object the improvement of parts of " the permanent way of a railway, and consists of forming the " tongue rail of a switch with a bearing surface for the flanches " of the wheels when passing a switch to run on, by which " will be prevented the shocks heretofore consequent on the " peripheries of the wheels coming against the fixed rail of a " switch; and the chairs of such switches, and also for other " parts of a railway, are formed of wrought iron, by rolling the " same and pressing the one side so as to receive and retain, " when wedged or keyed therein, a double-headed rail; and in " making the hinge chair, the same is constructed of wrought " iron, the hinge being formed of straps bolted to the main " rail, the strutting tubes being interposed to give stiffness."

[Expired 7th year. Printed, 10*d*. Drawings.]

A.D. 1854, January 12.—N° 84.

WILKES, Samuel.—(*Provisional protection only.*)—" Improvements in the construction of chairs and rails for railways."

"The object of this invention is to obtain more correct support " at the joint chairs of railways. For this purpose the joint " chairs are made in such manner that there is in each chair " a bearing across it for the end of each rail, and the end of " each rail is notched or cut out to fit the bearing, and in order " that the chairs may better support the rails, the two jaws " or cheeks of each chair are formed correctly to slide on to the " ends of the railway bars so as not to require wedging."

[Printed, 4*d*. No Drawings.]

A.D. 1854, January 16.—N° 97.

CROSSKILL, William.—(*Provisional protection only.*)—" Improvements in construction of portable railways."

" First, in making a railway of bridge rails, longitudinal sleepers, " and cross pieces, bolted or framed together in lengths or parts " so that each length is portable; and, secondly, in the manner

" of fastening together the ends of each length by sockets and " bolts, so that when put together they form one continuous " line, and can be laid down so as to be diverged when required " from a straight line and with sufficient flexibility to admit " of their being laid up and down hilly or undulating ground."

[Printed, 6*d*. Drawing.]

A.D. 1854, January 24.—N° 179.

ELLIS, William Irlam.—(*Provisional protection only.*)— " Certain improvements in turntables to be employed on or in " connection with railways."

" A *fixed central post*, pillar, or stud, round or upon which the " turntable is made or caused to revolve, in contradistinction to " the usual construction of similar turntables, wherein the post, " pillar, or central support forms part of or is attached to the " upper framing or platform of the table, and consequently " revolving with it. The said turntables may be made or caused " to revolve either in connection with and by the assistance of " rollers, centre pin, or any other means or mechanical arrangement " as usually employed, or it may be made or caused to " revolve simply and alone round or upon the said fixed post, " pillar, or stud, suspended and maintained at the required height " or level by means of a cap or plate having a stud or pin " projecting from its centre on the under side fitting into a recess " or step in or upon the top of the said fixed post, pillar, or " stud; the said cap or plate being attached to the framing " or platform of the turntable by bolts and nuts, or any more " suitable method. The said fixed post, pillar, or stud may be " supported by or erected upon a foundation formed of masonry " or any more suitable or convenient means."

[Printed, 4*d*. No Drawings.]

A.D. 1854, February 9.—N° 309.

RAMSBOTTOM, John.—" An improved hoist for raising and " lowering railway rolling stock and other articles."

" In the direct application of steam to work a ram or piston " acting on water or other incompressible fluid in such wise that " in a hoist with two platforms, each stroke of the said ram or " piston causes one platform to ascend while the other descends " the entire lift; also in the application of the said improvements

" to working a hoist with a single platform or with more than two " platforms."

[Expired 3rd year. Printed, 10*d*. Drawings.]

A.D. 1854, February 10.—N° 327.

RIVES, JACQUES.—" Improvements in railways and railway " carriages."

" The invention has for its object the reducing the amount of " power necessary for propelling trains on railways, and more " particularly on the curved portions of such roads, and at the " same time diminishing the risk of accidents, and this is done " by rendering the wheels independent the one of the other by " mounting one or both of them on tubes which slide on to " but turn independently of the axle, and in this way the lubrication of the rubbing parts is improved, the oil being supplied to " the space between the axle and the exterior tube. The passages " round curves are rendered more easy and safe by arranging the " axles in such a manner that they may be set at any angle the one " to the other, by means of screws or other suitable instruments " which are acted on by an arm which comes in contact with " guides fixed in the roadway, and which guides correspond with " the curve at the commencement of which they are placed; and " as the application of these improvements renders necessary " considerable steadiness in the train the carriages are connected " together by means of bars, which proceed from one side of one " carriage to the other side of the other, and vice versa, and the " steadiness is increased while running by imbedding in the " process of rolling a bar of steel in the tyre of the wheels, and " in the rails on which they run. The carriages are also so " connected together that the sudden stoppage or deviation from " the right course of the front carriage, by acting on a bar projecting from the carriage behind, forces a skid under the wheels " of the hinder carriage."

[Expired 3rd year. Printed, 1*s*. 4*d*. Drawings.]

A.D. 1854, February 20.—N° 397.

BARLOW, WILLIAM HENRY.—" Improvements in securing and " connecting the rails of railways."

Two keys or wedges of cast iron, wood, or other suitable material are used for securing a rail or the adjacent ends of two rails in a chair. The wedges are placed with their narrow ends towards each other, and the side of the chair is shaped to fit them. A long bolt passes through both wedges, and is provided with a nut, by screwing up which the two wedges are drawn together, and the rail or rails are thus firmly fixed in the chair.

The wedges and the opposite side of the chair may be made to fit close to the under side of the upper flange of the rail, and in some cases the rail or rails are caused to be entirely supported by their upper flanges resting upon the chair and the wedges.

In lieu of two wedges, sometimes one wedge is used, with a bolt of taper or wedge-shaped form, which is drawn up tight by means of the nut as before. Instead of employing the two opposite wedges, sometimes one long wedge is used, of cast iron or suitable material, and this wedge is fixed when driven in by means of a small key, or by running melted lead or other suitable metal into cavities made for that purpose in the back of the wedge and in the chair.

[Expired 3rd year. Printed, 10*d.* Drawings.]

A.D. 1854, February 22.—N° 431.

BOYDELL, JAMES.—" Improvements in applying apparatus to " carriages to facilitate the draft."

" This invention relates to the application of moveable detached " parts of a railway to the wheels of carriages, whereby each " part is successively placed by its wheel on to the road or " land over which the carriage travelled, each part of the portable " railway when down allowing its wheel to roll over it, the " wheel depositing and lifting the parts of the railway in suc-" cession, and in the application of side pieces to each portion " of the moveable rails so as to obtain a more extended bear-" ing for the rails whilst the wheel is passing over it, and in " the construction of the parts of the portable rails by com-" bining trough iron and wood to obtain great strength and " lightness."

[Printed, 10*d.* Drawings.]

A.D. 1854, February 24.—N° 456.

BELLFORD, AUGUSTE EDOUARD LORADOUX.—(*A communication.*)—" Improvements in turntables for railways."

"The object of this invention is to construct a turntable which
" shall possess the same strength and stability as the turntables
" in common use but may be constructed at a less cost, and which
" will require a comparatively small and therefore less costly
" foundation, and in balancing the platform of the turntable
" upon the revolving roller carriage which supports it in such
" a manner that either end of the said platform may be depressed
" to rest upon a bed or bearing provided for it, while it receives
" or has discharged from it an engine and tender or any carriage;
" and in furnishing the turntable between the roller carriage
" and platform on opposite sides of the centre with eccentrics,
" which are so arranged and can be so operated as to support
" the platform on a level previous to turning it, and hold it
" steady in such position during its revolution, or to raise one
" end and depress the other upon its bearings when it is desired
" to receive or discharge an engine and tender or carriage; and
" in furnishing the turntable with an indicator, which shows
" the engine driver or any other person when the platform is
" exactly on a level, or in which direction it inclines, and thereby
" serves as a guide by which to move the engine and tender
" or any carriage upon a platform, to such a position as to hold
" the platform in equipoise or on a level."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1854, February 25.—N° 464.

LAMPORT, CHARLES.—"Improvements in machinery used in
" ship building."

The patentee says that he employs "the ordinary railway for a
" travelling crane, to run the whole length of the slip on which the
" ship is to be built."

[Expired 7th year. Printed, 10*d*. Drawings.]

A.D. 1854, March 8.—N° 547.

DUNN, THOMAS.—"Improvements in machinery and apparatus
" for moving engines and carriages from one line of rails to another
" and for turning them."

"First, in constructing the bodies or upper framing of railway
" traversers and turntables of a convex form, in order to increase
" the strength and afford space for larger bearing wheels.

"Secondly, in supporting turntables on side rollers working on
" an inner circular rail or plate.

"Thirdly, in the application of several small rollers, and a live
" ring in place of the side rollers.

" Fourthly, in improved modes of constructing beams for rail-
" way turntables.

"Fifthly, in making the centre piece of the platform of a railway
" turntable with an inclined surface or surfaces in such wise that
" when pressure is applied thereto the platform is partially raised
" and caused to swivel on its centre.

" Sixthly, in the application to railway traversers of a centre pin,
" so as to render the same capable of acting as a turntable."

"Seventhly, in causing the axes of the wheels of railway tra-
" versers to radiate from a centre when traversers are used as
" turntables.

" Eighthly, in so constructing turntables that the level of the
" rollers or wheels in which the platform revolves can be regulated
" from the outside thereof.

"And lastly, in regulating the centre pin of turntables by a
" wedge and screw, instead of by screws only."

[Printed, 2*s*. 10*d*. Drawings.]

A.D. 1854, March 13.—N° 606.

HOPPER, George.—" Improvements in pins for railway chairs."

"The invention relates to the manufacture of wrought-iron pins
" or spikes as at present used for fixing and holding down the
" chairs used on railways; the particular form or class of pin or
" spike" referred to " is that wherein the body of the pin is spirally
" twisted, so as to give it a better hold in the sleeper. Such pins
" or spikes as hitherto made are manufactured out of square
" bar iron, and the shank or body is left square at its head, or
" neck portion beneath the head. Now according to this inven-
" tion the neck portion is formed round or cylindrical in transverse
" section instead of square or rectangular. Pins or spikes made
" in this way fit accurately all round in the holes of the chairs;
" they allow no jarring wear to take place, and the chairs, and
" consequently the rails, are held with much more firmness than
" hitherto."

[Expired 3rd year. Printed, 6*d*. Drawings.]

A.D. 1854, March 14.—N° 609.

RUSSELL, Frederick.—(*Provisional protection only.*)—" Improvement in apparatus for clearing obstructions on railways."

" This invention relates to the removing of obstructions on the " rails or to the clearing of snow from the line, and consists in " fitting to the front of the engine or first leading carriage or truck " of the train, a peculiar shield, made rather pointed or sloping " back from the centre on each side. This shield is nearly the " width of the line, leaving a clearance of about two inches on " each side between the edge, the shield, and the inner side of " the rails. A suitable framing is fitted to the front of the " engine or carriage to receive this shield, which constitutes the " snow clearer, acting as a plough to cut through the snow, " and turning it off sideways similar to the action of a ploughshare. For removing obstruction on the rails themselves a " pair of spring hinged guards or scrapers are employed, fitted to " each side of the engine or carriage framing, and situated " immediately over the rail; these guards or scrapers placed angularly over the rail, are so made that they may give slightly " either way should any fixed obstruction occur, as the starting of a joint in the rails for example. The bottom of the " guard, or that nearest the rail, is also made moveable, being " connected by vertical slides to the upper portion, and is " kept down near the rail by a curved spring. By this means " the oscillation of the springs of the engine or carriage is " allowed for, thereby enabling the guard to be much nearer " the rail than in the ordinary arrangement. These lower moveable pieces are made so that they may be easily taken off " when worn or out of order and new ones supplied."

[Printed, 4*d*. No Drawings.]

A.D. 1854, March 18.—N° 649.

PARSONS, Percival Moses.—" Certain improvements in the " construction of the permanent way of railways."

The patentee says, " firstly, I construct the chairs which secure " the ends of the rails of a suitable form to receive them, and " I place in the jaws small blocks or pieces of wood or other " suitable elastic material, and I drive in wedges or keys of " cast or wrought iron or other suitable metal between and

" against them and the rails, or I place in the chair against " the rails, metal keys, clamps, splices, blocks, or plates, and I " drive in wedges made of wood or other suitable elastic material " between and against them and the jaw of the chair.

" Secondly, I construct chairs for securing the ends of the rails " in similar parts, each being made with a jaw to receive the rail, " and a taper plate splice projecting from the under side of the " chair, and vice versa.

" Thirdly, in order to strengthen the chairs, I construct them " with ribs, webs, or flanges at the bottom and sides.

" Fourthly, I secure the ends of the rails by means of clamps " or taper plates or splices, in two similar parts, made to fit " against the two sides of the rails, and support them by their " upper flanges, each clump, plate, or splice having a jaw or arm " at one end, into which may be placed small blocks or pieces of " wood or other suitable elastic material to receive the opposite " end of the other; these I force each into the other with the " rail between, or I place each in the other with the rail between, " and I tighten them by driving in wooden or other elastic " keys or wedges between them and the jaws or arms."

[Expired 7th year. Printed, 10*d.* Drawing.]

A.D. 1854, March 22.—N° 676.

WATSON, THOMAS SIMONS.—" An improved railway traverser."

" An improved mechanical arrangement for transferring railway " carriages across a railway from one line of rails to another, by " placing such carriages on pairs of detached rails resting on " moveable chairs, such chairs being carried on wheels, by which " they traverse on cross rails transverse to the line of railway, " so as to preserve the detached rails always at the same level " as the rails of the permanent way, motion being communicated " to the chairs by two or more endless chains, which pass over " wheels at each side of the permanent way and below its level. " The said wheels are put in motion by a system of cog wheel " screw, and bevel wheels; part beneath the platform of the " railway, part contained in a hollow column passing up " through the platform, and moved by hand by a winch, the " axle of which passes through the side of the column."

[Expired 3rd year. Printed, 1*s.* 10*d.* Drawings.]

A.D. 1854, March 25.—N° 697.

BAGOT, Edward.—" Improvements in the manufacture of rails " for railways."

" Proposes to construct each rail of two or more distinct pieces " of iron, to be held together by bolts or screws, the object being " to facilitate the manufacture and renewal of rails, so that " when any one portion, for instance the top, is worn out, a " new piece may be inserted without disturbing or discarding " the entire rail, as is at present done. The novelty of the " invention consists in the manufacturing of rails in two or more " pieces, instead of rolling them out, as at present, in one piece " from a single pile of iron, and to adapt one general principal " to the manufacture of rails of every variety of section, namely, " to construct them of two or more pieces of wrought or rolled " iron, so that when put together the component parts shall " form one rail and preserve the outline of the original, rolled " singly, as nearly as circumstances will admit of."

[Expired 3rd year. Printed, 1s. 10*d*. Drawings.]

A.D. 1854, March 29.—N° 722.

BARLOW, Charles.—(*Provisional protection only.*)—" Certain " improvements in the permanent way of railways."

" Constructing chairs, with ribs or flanges on their under side, " for the purpose of increasing their strength, in addition to those " usually employed at the sides, and employing metal keys or " wedges to fasten the rails into such chairs; and also placing " in the jaws of chairs so constructed or otherwise blocks or " cushions of wood or other elastic substance, to receive the " pressure of the metal keys or wedges, which are slightly in- " dented, notched, or serrated at the part in contact with the " blocks or cushions; and in the use of wood with the fibres " placed in a direction across that in which the keys are driven, " so that the pressure may be sustained by them in the direction " of their length, either for the blocks or cushions or for keys " to hold the rails, or to hold plates of metal against the rails, " which plates in some cases are placed in the chair instead of " the metal keys. A pair of chairs are employed each having " a plate or clamp fitting the side of the rails attached to it, " and extending beyond the base on one side and a jaw on the

" other, and the rails are secured therein by forcing the two " chairs together, and the plate or clamp of each chair into the " jaw of the other; or a pair of plates or clamps made to fit the " side of the rails are employed, each having a jaw at one end, " and the rails are secured by placing one on each side, and " forcing the end of each plate or clamp into the jaw of the other; " the under side of the plates or clumps are made with a " sufficiently wide bearing surface to rest on the sleeper."

[Printed, 4*d.* No Drawings.]

A.D. 1854, April 6.—N° 789.

SMITH, James.—" Improvements in the construction of rail- " ways."

" In making the iron chairs used in constructing a line of rail- " way with the sleeper combined, which combination is effected " by having the chair and sleeper cast together. By such " formation of the chair and sleeper a firmer bearing will be " produced, whilst the base of the sleeper is brought nearer to the " upper surface of the ballast. In constructing with the " combined chairs and sleepers what is usually called the per- " manent way, more facility will be obtained in laying them, and " less thickness of ballasting material required. It will also be " found that the permanent way can be better maintained at less " cost and more effectively drained."

[Expired 7th year. Printed, 10*d.* Drawings.]

A.D. 1854, April 8.—N° 828.

KEMP, Henry.—" Certain improvements in the preparation of " wood for planking and sheathing ships and other vessels, also " in house, ship, and pier building, railway sleepers, &c., and all " other purposes whatsoever where wood is required."

"The improvements relate to the preparation of wood to be " subsequently employed or used for railway sleepers, and works " and building generally.

"The mode of operating or preparing the wood is to subject it " to the action of sulphate of barytes after calcination with " charcoal, which renders it soluble in water, and sulphate of " copper."

[Expired 3rd year. Printed, 6*d.* Drawing.]

A.D. 1854, April 11.—N° 855.

JAMES, William Henry.—" Improvements in marine and other " structures."

" The applications of cellular plates and vessels and corrugated " and embossed plates formed by rolling, grooving, and otherwise " consist in the employment thereof in the construction of the " hulls or other parts of steam vessels or other floating bodies for " the purpose of imparting great strength thereto as well as " buoyancy, also in the part construction of buildings, whether " portable or otherwise, as in the forming of floors, &c., whether " composed of iron or other suitable materials; or for the forming " of roadways, bridges, viaducts on the sides of aqueducts, tanks " or other vessels for conducting or containing fluids; or for " uniting together in a similar manner by grooves and dovetailed " or other rabetted cavities and corresponding holdfast tenons, the " upper and under surfaces of metallic rails for the constructions " of railroads, so as to enable such rails to be formed in parts " either of the same or different kinds or qualities of metal."

[Expired 3rd year. Printed, 6*d*. No Drawings.]

A.D. 1854, April 21.—N° 918.

CAMMELL, Charles.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

" First, in making the rails for the permanent way of railways " of bars of steel, or iron bars cased with steel, or case-hardened " iron, so as to harden the surface of the rail, and enable it to " resist abrasion and the great wear and tear to which the rails " are now subjected by the heavy traffic that passes over them.

" Secondly, in forming the rails whether made of steel, iron " bars coated with steel, or case-hardened iron of a peculiar form " so that when one surface has become worn the rail may be " turned over in order to bring one of the other and unworn " sides uppermost.

" For this purpose the rails are made square or rectangular in " their section, so as to present four equal sides. By this means " a great economy will be effected as all the four sides of the " rail may in their turn serve as the upper or working surface. " This rail is secured in a wrought or cast iron chair affixed by " preference to longitudinal sleepers."

[Printed, 4*d*. No Drawings.]

A.D. 1854, April 22.—N° 931.

WARREN, James.—"Improvements in the construction of " railways."

These improvements consists of forming each railway bar with three or four bearing surfaces, so that when one is worn another may be brought up to become the bearing and wearing surface for the time being. These rails may be made of cast iron and hollow with a view to obtain lightness, or they may be made of wrought iron. The bearing surfaces, which for the time being are not in use, offer greater facility for fixing such forms of rails in constructing a railway. In making switches, two rails on either side of a way are combined together on a plate or otherwise; these two rails on either side of a railway come up to and are in gauge at one end with the two lines of railway with which they are to communicate, and at their other end they are capable of being made to range with a single line of way, in some cases using fixed and in other cases moveable guards, and in both cases dispensing with the ordinary moveable facing points heretofore used. In fixing rails in chairs, in some cases wedges are introduced under the rails, to raise and fix them in their chairs.

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1854, May 3.—N° 996.

POOLE, Moses.—(*A communication.*)—"Improvements in paving " or covering the surfaces of roads, streets, or ways."

"In covering the surface of a street or way with boxes made " of iron, of a circular or other convenient form and size divided " into sections, which sections are to be so small as not to admit " the hoof a horse between them, by compartments of iron which " are so arranged as to strengthen the whole, and, together with " the run of the boxes, are grooved in such a manner as will " most effectually prevent the feet of horses or wheels of carriages " from slipping. The boxes are keyed or linked together, and " the interstices or sections are to be filled.

"Among the compositions which may be used, asphaltum, " and a composition made of stone and shells, broken small and " mixed with hydraulic and other cement."

[Printed, 6*d*. Drawing.]

A.D. 1854, May 6.—N° 1022.

JOHNSON, John Henry.—(*A communication from Antoine Francois Julien Doebs.*)—"Improvements in the construction of " railway carriages."

"The said invention relates to a peculiar construction and " arrangement of break for railway carriages, and to an improved " mode of arranging the seats in railway carriages, which seats " are made to slide, and thereby prevent the shock which would " arise through a sudden stoppage of the train by the application of the brake. The brakes themselves are composed of a " series of sliding shoes or sledges attached to the framework of " the carriages; they are brought into action and made to bear " upon the rail by lowering the body of the carriage by suitable " gearing. This gearing may either be actuated by the guard " of the train or it may be acted upon, and so lower the carriage " should the same accidentally run into any obstacle on the line, " in which case it would greatly diminish the shock on such " an occasion. For this purpose a telescopic apparatus is placed " in front of the train and the compression or closing of this " apparatus on coming in contact with any obstacle will bring all " the sledges into action, and cause the train to bear entirely " upon them and slide along the rails, thereby effectually bringing it to a standstill within a shorter distance than has hitherto " been accomplished."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1854, May 9.—N° 1033.

ADAMS, William Bridges.—(*Provisional protection only.*)— " Improvements in rails for railways, and modes of connecting " and fixing them."

"In connecting to adjoining bridge rail ends together by " applying two metal side clips, either as half chains or brackets, " and connecting them by bolts passing horizontally beneath " the rails, with an iron tongue piece entering the hollow of the " bridge rail so adjusted that by the act of screwing up the " bolts the tongue piece will be forced upwards towards the " crown of the rail, and the side clips will be forced downwards " towards the upper side of the rail flanges; and the tongue " piece may bear both against the crown of the rail and the " flanges also, or against either of them separately. And in the

" case of foot rails, instead of a tongue piece a wedge piece may " be used below the rail. And instead of horizontal bolts " vertical bolts or clips may be used, clipping the tongue piece " or foot piece and passing through the horizontal flanges of the " rail and screwing down thereon either with side clips or without; or a plain plate may be used beneath the rail."

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 9.—N° 1036.

LIDDELL, Charles.—" Improvements in the permanent way " of railways."

" First in an improved fastening for the joints of rails. The " ends of the rails are laid on joint sleepers, with the joint at or " near the middle of their length, and are secured to them by " wrought angle pieces fitted on each side of the rails and screwed " or rivetted to the sleepers, and through the rails to each other. " The angle pieces may be either continuous or divided into " three or more parts. The sleepers may be flat or of any form " convenient for the purpose, and the same kind of sleepers " and fastenings may be used for intermediate bearings.

" Second in a new mode of securing double headed rails to " ordinary sleepers. This is effected by the use of pieces of angle " iron, rolled to fit the sides of the rails, the rails being placed " athwart the sleepers in grooves formed to receive them and the " angle iron pieces being bolted, spiked, or screwed to the " sleepers and bolted or rivetted through the rails to each other. " For intermediate bearing it is proposed to make the angle iron " pieces about six inches long, and for joints about eighteen " inches long, but these lengths may be varied."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1854, May 12.—N° 1068.

WESTLEY, William King.—(*Provisional protection only.*)— " An improved construction of railway and carriages to be " employed thereon, applicable chiefly to farm purposes."

"The chief object of this invention is to produce a cheap " temporary railway over which light carriages suitable for " carrying farm and other produce might be run. The railway is " proposed to be supported upon a row of pillars on opposite sides " of which the carriages are intended to run.

"These pillars project through and serve to carry a line of " wood planking to the sides of which iron rails are affixed. " Upon these rails which form a double way run the wheels of " the carriages; and for a further support to the carriages, and " to keep them perpendicular, the pillars carry at their upper " ends a similar arrangement of rails against the inner face of " which antifriction rollers mounted on the top of the carriages " bear. The carriages may be transferred from one truck to the " other by means of turntables, consisting of a rotating frame " mounted on a pillar for its centre of motion and carrying upper " and lower rails corresponding to those of the main line. If " thought desirable these may form part of the main line."

[Printed, 4*d.* No Drawings.]

A.D. 1854, May 13.—N° 1074.

GARFORTH, CHARLES.—(*Provisional protection only.*)—"Certain " improvements in apparatus to be employed in the construction " of the permanent way of railways."

"The invention consists in the application, employment, or " use of a double wedge placed between the rail and the chair, " the inclined surfaces of which shall so operate or act upon each " other as to tighten up the rail in the chair being independent " of the chair and dependant entirely upon itself for effectively " securing the rail in lieu of the present wooden keys and other " insecure contrivances. The method of effecting this invention " is by bringing the two inclined planes of a double wedge into " juxtaposition and by means of a headed screw or bolt passing " through both wedges (the head of the screw or bolt resting " on the base of one wedge and one of two nuts acting on the " base of the outer wedge), to cause the inclined planes to slip " or pass over each other, thereby enlarging the expanse of the " double wedge, and permanently tightening up or securing the " rail in the chair. When such operation has been completed " the first nut may be secured by a second or lock nut in its " position. The wedges may either be made of metal or wood, " or both; or they may be used separately, of metal or wood, " or combined, and thus employed in the construction of the " permanent way of railways."

[Printed, 4*d.* No Drawings.]

A.D. 1854, May 16.—N° 1087.

MILLER, THOMAS WILLIAM.—" Improvements in railway " sleepers."

" This invention has for its object improved arrangements or " constructions of wrought-iron sleepers for railways by employ" ing plate iron and angle iron and combining the same and " uniting the parts by rivets or otherwise.

" When making longitudinal sleepers the several parts of which " the same is composed should be so combined that the ends there" of and the ends of the rails shall not come together, but that " they shall break joint not only in respect to parts of the longi" tudinal sleepers themselves but also in respect of the rails, by " which greater uniformity of strength will be obtained than when " the ends come all opposite the same place; and these sleepers " may be kept apart at their proper distances by ordinary stretch" ing bolts with collars and nuts or otherwise."

[Expired 3rd year. Printed, 10*d*. Drawings.]

A.D. 1854, May 16.—N° 1090.

MILLER, THOMAS WILLIAM.—" Improvements in railway " sleepers."

The patentee says " This invention has for its object improve" ments in the forms of railway sleepers when wrought iron is " used, and consists of employing certain forms of angle iron " which may be coated with zinc or other matter to preserve and " protect them; and in place of having chairs fixed thereto, the " rails themselves when of a form to admit of it may be fixed to " the sleepers by screw bolts and nuts or otherwise. I also make " longitudinal railway sleepers of like forms of rolled wrought" iron bars, but in such cases I have them rolled as long as I " can, and I cause chairs suitable for the rails used to be fixed " thereto by screw bolts and nuts or otherwise, or the rails them" selves may when of a convenient form be fixed by screw bolts " and nuts or otherwise to the sleepers, and, when desired, the " ends of the several sleepers may be connected one to the other " by fishing pieces as is now practised with respect to the ends " of rails; and when fixing the rails, whether in chairs or directly " to the sleepers themselves, care should be taken that the ends " of the rails and the ends of the parts of a longitudinal sleeper

" do not come opposite each other, and these sleepers may be " kept apart at their proper distances by ordinary stretching " bolts with collars and nuts or otherwise."

[Expired 3rd year. Printed, 1*s*. 8*d*. Drawings.]

A.D. 1854, May 19.—N° 1120.

DE FONTAINEMOREAU, PETER ARMAND LE COMTE.—(*A communication.*)—" Improvements in connecting the permanent " rails of railways."

" In connecting the permanent rails of railways by adapting " to one side of the joints an iron fish and fixing the same by " means of a key.

" The object proposed by this invention is to obtain rigidity at " the joints of the rails by fixing them in their chairs in such a " manner that without opposing any obstacle to their expansion " and contraction, they may have the rigidity of a continuous " rail from one end of the line of railway to the other.

" To effect this in place of a wooden key a cast-iron fish is " employed, which is kept in its place in the chair by an iron " key, which is interposed between the chair and the fish. The " fish may vary in length. One side of the fish is made to fit " exactly against the rail, so as to press against and support it; " the other side next to the chair is grooved out, so as to allow " the key to fit in between it and the chair. This groove is " terminated at each extremity by a swelling, so as to make the " key when driven home to take a curved form, and thus prevent " its becoming loose. The iron at the head is sufficiently thick " to admit of a rectangular hole being made for the purpose of " withdrawing the key when necessary."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1854, May 19.—N° 1121.

GLADSTONE, THOMAS MURRAY.—(*Provisional protection only.*) —" An improved traverser or machine for shifting railway car- " riages from one set of rails to another."

" The invention consists in mounting upon suitable bearings " which are sunk beneath the level of the line of rails four or " more sets of traverser rails which are connected by an endless " chain or band, and each of which sets when in the proper posi-

" tion present themselves on a level with the permanent way. " The endless chain being worked causes the shifting traverser " rails to travel over and under or round the bearings upon which " the traverser rails are supported."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 1.—N° 1212.

DUNCAN, DAVID.—" Improvements in railway points or " switches and crossings."

"The invention consists in a new section of rail. This rail " differs from all others in use by having one side fluted and the " pressure side rolled solid throughout, with a base flange on " either side of the rail to hold on to the bed of the respective " chairs used in the fitting, as will be described hereafter, to " secure the key by forming a lip with the clasping chair, thus " giving a great security to the rail, and preventing any oscilla- " tion; by this section of rail there is produced all the necessary " strength desirable for the pressure side, and which is a defect " to those sections heretofore used, and is thereby less liable to be " crushed and broken down, and will consequently afford greater " security to traffic generally, and especially if this said section be " used, as it can, may, and is intended to be used, for permanent " ways generally, by which use there will be less liability to " accidents, at present so prevalent, by the breaking down of the " runing side of the **B** and **T** sections of rails at present in use, " and especially as regards points or switches and crossings. It " is further intended to give strength to the crossing by weld- " ing a solid piece of hammered iron to the long point rail, and " to plane the rail to the required angle, which is screwed on form- " ing the **V** part of the crossing."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1854, June 2.—N° 1222.

GREENSHIELDS, THOMAS.—"Improvements in railway chairs."

By constructing the chair of two or more pieces, that is to say, of a bottom piece or sole of the required length and breath of the chair, and two bracket pieces. The bottom piece or sole is to be made thicker at each end than in the middle, to form ledges or butments for one end of each bracket piece. One face of each bracket piece is made to fit half or nearly half the transverse section of the rail; the other face of each bracket piece is to rest and slide upon the sole; the end of the face resting upon the sole is to be made out of square, that is to say, not at a right angle with its side, the angle formed by the longest side and the end to be less than a right angle. The inside bracket piece is to be fixed upon the sole, and secured with screws, bolts, or rivets before the chair receives the rail, when the rail is placed in the chair the other or outside bracket piece is placed (and from its construction) and when driven up it will draw or tighten against the butment on the end of the sole and the side of the rail, and must be driven up until the rail is clipped or held firmly between the bracket pieces; a bolt or pin is then to be passed through the bracket pieces, and the sole to secure the chair to the sleeper, and thus securing the rail firmly in position, and preventing the bracket pieces from shifting or becoming slack.

[Expired 7th year. Printed, 8*d*. Drawing.]

A.D. 1854, June 19.—N° 1327.

HENRY, Louis Ambroise.—"Certain improvements in con-" structing railroads."

"First, of several new or improved kinds or forms of sails, " applicable to what is called the permanent way of railways, being " contrived so as to dispense with the ordinary cast-iron chairs, " wedges, and cross sleepers. A rail is formed like an inverted U " from skelps of wrought iron, which are thicker in the middle " than towards the longitudinal edges. The rail has a flange at " the base for fixing it, by means of bolts and nuts, upon cast or " wrought iron plates laid down at suitable distances, about seven-" teen inches square. The top of the rail has about one inch and " three-eighths in thickness, which is diminished to seven-eighths " of an inch in the flange. The plates are also made a little con-" vex and bent down perpendicularly on both sides parallel to " the road so as to consolidate the ballasting. The rails are kept " apart and secured together by means of iron rods of about " one inch diameter, which are bolted or fixedon the plates, " which are about one yard distant. Secondly, of various kinds " of railroads for vehicles, called a road rail or economical railway. " This rail has an oblique at both edges of the horizontal part, " so that the rail may be inverted or turned over when one side " *is worn out*. The outer flange is for strengthening the rail and

" retaining the ballast upon which they are put. Each line of " rails rests on a layer of ballast, about one foot wide by eight " inches deep. The rails are held together by means of plates " which are connected by hooked rods secured in their places by " cotters. These rails are slightly convex towards the middle, " and an inclination of a quarter of an inch is given to the rail " for letting the water and mud run off."

[Expired 3rd year. Printed, 2*s*. Drawings.]

A.D. 1854, June 19.—N° 1329.

ANDERSON, Sir James Caleb.—(*Provisional protection only.*) —The patentee says, " To work the line I fix high pressure " engines at such distances as may be found requisite; on the " top of the chamber which encloses the rails the chimneys of the " engines are to be placed. The exit steam of each engine is to " be permitted to escape at a good pressure into its chimney. " By this arrangement the air in the chamber will be drawn up " the chimney, and thus a strong current of air will be caused to " rush into the chamber at the opposite end to that at which the " engine is at work, and in the direction of the working engine."

" On the rail I place a carriage, the back of which is nearly equal " to the square of the vertical section of the chamber. The air in " the front of the carriage being drawn by the exit steam up the " chimney or chimneys of the working engine or engines, the " incoming air, by pressing on the back of the carriage, will force " it forward at a velocity equal to that at which the air in the " chamber moves, minus the friction.

" As the exit steam will create the current of air required to " give the motive power, the engine power can be let at profit, " and thus passengers, goods, and letters can be conveyed con- " tinually to the principal towns of the kingdom without any cost " for power.

" It will be necessary to put windows when passengers are to " be conveyed."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 30.—N° 1432.

EDWARDS, John.—" Improvements in railway chairs."

Instead of the present form of chair on which the rail rests, and is wedged tightly to prevent it slipping out of its seat, it is proposed to cast or make the chair in two parts, the inner chap is to be loose with an arm extending a part of the length of the chair, and dovetailed in the form of a wedge, with a slot to allow it to move or slide, so that when a chair has to be replaced the new one can be put or slid under the rail withont disturbing it and the other chairs, and then the inner or separate chap put into its place, and by means of the dovetailed wedge presses tightly against the rail, preventing the necessity of loose wedges; and as an additional security the loose chap is held secure by a screw bolt or similar contrivance, screwing both parts firmly together, and by the wedge-like form of the extreme end where the one part fits into the other the more securely and tightly, the two parts are screwed together the more firmly; the rail will be wedged without using separate wedges.

[Expired 3rd year. Printed, 10*d.* Drawings.]

A.D. 1854, July 4.—N° 1457.

SUNTER, JOSEPH.—" New or improved drilling machinery."

" A drilling machine constructed according to this invention is " placed upon a truck or platform, mounted upon wheels, so that " it can readily be transported from place to place. A great " number of sets of drills may be used, and the sets of drills may " be composed of a greater number than four each. Besides the " rotatory motion, it is necessary that the drills have an advancing motion, that is to say, they must move in the direction of " the axis about which they are rotating. The pinons which " engage in the racks on the drill axes may be geared together, " so that one winch and worm wheel may be sufficient for each " set of drills."

" The machine described is especially calculated for drilling " railway bars, for fish-jointing the same, as well as for drilling " plates or bars situated horizontally."

[Expired 3rd year. Printed, 10*d.* Drawings.]

A.D. 1854, July 4.—N° 1463.

NEWMAN, JAMES.—" Improvements in the manufacture of " metallic rods, rails, and bars."

In manufacturing metal rods, rails, and similar forms with a sandy or stony core or centre, with a view to obtain economy of metal and increased strength. For this purpose take a billet or short tube of metal, and one end of this billet being plugged ram it tightly with sand, earth, or analogous material, which is to be thoroughly dried, after which, the open end of the billet is to be plugged. This billet is then heated to a suitable heat, and removed to a train of rolls or a draw bench, by which it is rolled or drawn out to any reasonable length.

[Expired 3rd year. Printed, 4*d.* No Drawings.]

A.D. 1854, July 6.—N° 1491.

POLE, WILLIAM.—" Certain improvements in the construction " of railways."

One of the objects is to increase the strength, durability, and stability of the rails of railway crossings. For this purpose it is proposed to form the points of such crossings by continuing each of the two converging rails completely through to the extremity of the point, and then connecting them firmly together by any suitable means, such as welding bolts or rivets, or the two arms of the point are formed from one rail doubled up upon itself and then fashioned into the proper shape.

The point thus formed is held fast in its chair by wedging it up with transverse keys which pass through the point and bear against the chair. To permit of the economical renewal of the wing rails and the "point" double fish chairs are employed to form the junctions between them and the continuing rails of the line.

Another object is to lessen the cost and increase the security of what are termed "fish joints" for rails. In such joints it is customary to screw the fishing plates together by bolts and nuts passing through them and the rail.

The improvement is to "tap" one of the fishing plates and screw the bolts into it, by which means the cost of the nuts and of a certain length of the bolts will be saved, and the tendency of the bolts to become loose will be reduced; or if the nuts be added, they serve as setting nuts, by which the bolts are secured still more firmly.

[Printed, 10*d.* Drawing.]

A.D. 1854, July 15.—N° 1558.

WRIGHT, THOMAS.—" Improvements in the permanent way of " railways."

"The feature of this invention is, that a single sleeper is made "to form a complete roadway, which is made in one entire massive piece or casting, in order to sustain the two collateral rails "upon one and the same sleeper without jointings, either longitudinally or transversely. Timber, felt, or any other suitable "substance may be interposed between the joints of the sleepers, "as well as underneath and on the sides of the rail seatings, and "between the rail and sleeper. Any known shape of rail or loose "chair may be secured to the top flange of the sleeper, either with "or without soft or rigidity neutralising substance intervening.

"The improved forms of rails consist of a perfectly square bar "rail, a tyre bar rail, and a dovetailed rail; and the improved "mode of holding the same consists in the imployment of a vice "jaw fastening, the rail being held between a fixed lug cast on or "attached to the sleeper, and a moveable piece, acting like a vice "jaw, and tightening up by means of bolts and nuts, passing "under or through the rail."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1854, July 15.—N° 1559.

ASHWORTH, JOHN.—"Certain improvements in apparatus to "be employed in the construction of the permanent way of rail"ways."

"The improvement consists in the application, employment, or "use of a plate, or portion of a plate, or bar of iron, or any other "suitable material, the sides of which shall correspond with the "respective surfaces of the chair and rail or rails between which "it may be placed, such plate, or portion of plate, or bar being "adjusted or 'tightened up' by means of a screw or screws "passing through one side of the chair, and bearing against the "plate, or portion of plate, or bar, in which is drilled or otherwise "sunk a hole or holes or perforation, thereby (when the rail is "tightened up), and by the use of a lock nut, permanently "securing the plate or bar, and preventing any lateral or other "shifting. In lieu of tapping or screwing through the entire side "of the chair it may be desirable to cast the chair with a recess "on the interior on the side for the screw, wherein a block or nut "may be dropped, and considerable saving in the screwing or "tapping of the chair be effected, as the nut only will require to "be cut."

[*Expired 3rd year.* Printed, 10*d.* Drawing.]

A.D. 1854, July 27.—N° 1660.

MILLER, Nathaniel, and GRAHAM, Robert.—(*Provisional protection only.*)—" Certain improvements in the construction of " certain parts of the permanent way of railway, commonly called " crossings."

" It is proposed to employ a solid block or 'crossing piece' of " metal, tapered as required, and bolted at its apex to its side " rails, with intervening space occupied by small blocks or " wedges, preserving the proper space between the side rails and " centre block, and the side wedges, plates, or blocks so placed as " to be below the action or passage of the tyre of the wheel, having " bolts properly secured and passing through the whole. The " base or broad end of the solid block or 'crossing piece' receives " against it the entire section of the two rails (neither of which " are tapered), besides being furnished with a tongue-piece, which " fully occupies and passes some distance into and between the " hollowed out portion of the side of the rails. As the rails converge to a point, the tongue-piece of the solid block between the " rails they must assume a wedge shape when such respective parts " are bolted together with the aid of 'fish' pieces or plates. On " each side of the rail a joint will be formed, perfectly rigid and " firm, and by a peculiar arrangement of the chairs, as well as the " method employed in securing the apex of the block, all danger " from the depression, elevation, or lateral shifting of the " 'crossings' will be entirely prevented."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 29.—N° 1674.

SMITH, William Henry.—(*Provisional protection only.*)—" Certain improvements in the permanent way of railways."

" The invention consists in the use of a chair formed in two " parts adapted to each other so as to form a kind of joint, the " pressure of the rail with the superincumbent weight causing " the jaws or upper parts of the chair to clip the rail firmly " between them. In case it should be found desirable, a wedge " or spike may be inserted between the two parts of the chair just " underneath the joint for the purpose of keeping the parts of " the chair closer against the rail. The ordinary key may be dispensed with, and a strip of yielding material may be inserted " on one or both sides of the rail, or within a recess formed in

" the inside of the chair. The chair may be cast hollow in the " base if preferred.

" And in the use of a rail formed with three or more heads or " bearing surfaces, so that when one is worn the rail may be " turned and another presented for use."

[Printed, 4*d*. No Drawings.]

A.D. 1854, August 23.—N° 1852.

YOUNG, James Hadden.—" Improvements in the construction " of railways."

" Consists of so constructing a railway as to take advantage of " the tensile property of the iron used, in place of simply depending, " as at present, on the property which the rails have to resist " bending; for which purpose the rods or wires used are kept in " a state of tension by being stretched over posts, sleepers, or " other fixtures, according to the inequalities of the ground, " the two end posts which hold the wire in tension being securely " fixed in the ground, whilst the intermediate posts may be less " firmly secured, as they only serve to steady the rods or wires. " On these stretched rods or wires the vehicles are proposed to " run, as on the rails in ordinary use. Besides the usual flange " to the wheels, guide wheels are fixed to the vehicle, to prevent " it going off the rods or wires."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1854, August 25.—N° 1866.

SKINNER, James Thomas.—(*Provisional protection only.*)— " Improved apparatus for rendering the shunts or points of rail" ways self-acting, applicable also to the working of railway " signals."

" The locomotive engine is provided with a bar or lever, which " shall act as a wedge, and when set for that purpose strike against " a bowle, carried by a sliding plate, situate between the rails of a " line of railway, and impart a sliding motion to that plate, which " motion, by the connection of the plate with the shunts, will be " communicated thereto."

" A weighted vertical bell crank lever is employed for keeping " the shunts in the position which leaves the main line open, and " by means of a pair of horizontal bell crank levers and connect-

" ing rods the lateral movement required is given to the shunts or " points for turning the engine off the line of rails on which it is " running."

"The engine is furnished with a wedge bar, which may be " raised or lowered at pleasure by the engine driver. When in its " raised position the engine will pass the sliding plate without " acting upon it; but when the wedge bar is lowered, its inclined " edge will press against the friction bowle of the sliding plate, " and bring the shunts into position in time for the fore wheels " of the engine to pass over them."

[Printed, 4*d*. No Drawings.]

A. D. 1854, September 5.—N° 1941.

BARNES, WILLIAM.—(*Provisional protection only.*)—" Improvements in fastening rails of railways."

" The invention consists in fastening the rails of railways by " the use of plugs inserted into their ends. For this purpose a " hole is drilled in a line with the length of the rail, of the diameter and depth suitable to the plug to be used; the plug is " then inserted into the end of each of two lengths of rail, and " the ends being brought together the fastening is complete."

[Printed, 4*d*. No Drawings.]

A.D. 1854, October 5.—N° 2140.

ADAMS, WILLIAM BRIDGES.—" Improvements in rails for railways and in the connections and fastenings for rails."

In the sectional forms of bridge rails, by deepening the vertical sides below the level of the horizontal flanges or bearing surfaces, so as to make the rails vertically stiffer.

In turning down the edges of the horizontal flanges, so as to make such flanges vertically stiffer.

In forming the vertical projecting portions below the horizontal bearing flanges of bridge rails at acute or obtuse angles instead of right angles, for the purpose of better jointing or connecting the rails together.

In forming the lower or bearing portions of bridge rails and also of foot rails to angular instead of horizontal section, for the purpose of better jointing or connecting the rails together.

In forming the bearing flanges placed at the mid-depth of girder rails of a wedging form for the purpose of better jointing or connecting, and in forming central flanges on double-headed rails between the upper and lower tables.

In jointing or connecting bridge rails together by means of what is called a truss joint.

In jointing or connecting girder rails by bracket or clip joint.

Applying the clip or bracket joints, when required, by reducing in width the horizontal bearing flanges of any of the above-described rails.

Peculiar formed chairs or brackets of wood or metal to support the intermediate portions of rails.

[Printed, 10*d*. Drawing.]

A.D. 1854, October 10.—N° 2162.

CROSSKILL, William.—" Improvements in the construction ' of portable railways."

" First, the construction of railways in frames or lengths, hav- " ing the longitudinal sleepers and rails connected to the cross " sleepers in such manner that each length or frame can be folded " together for transport or shipment without being taken to " pieces."

" Secondly, the connecting together the ends of the longi- " tudinal sleepers and rails of the frames or lengths by means of " loose transverse sleepers."

" Thirdly, the making of the longitudinal sleepers and rails for " railways of two or more different lengths capable of being " arranged so that when the long and short lengths are laid " down alternately on each side the railway shall form a straight " line, but so that when some or all of the long sleepers and rails " are laid down on one side, and some or all of the short ones on " the opposite side, the railway shall form a curve."

" Fourthly, the construction of the rails for the purpose of " enabling carriages or vehicles having either wheels with flanged " tires or wheels with flat tires to travel upon the same railway."

[Expired 3rd year. Printed, 1*s*. Drawings.]

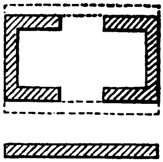
A.D. 1854, October 23.—N° 2257.

SIMMONS, George.—(*Provisional protection only.*)—" Im- " provements in the construction of railway bearers and sleepers."

" This invention consists of constructing hollow railway bearers

" and sleepers of wrought iron of the following forms combined " together :—

" Two angle irons of the sectional form



" are combined with plates at the top and bottom by rivets or " bolts or by the rails of a railway."

[Printed, 4*d*. No Drawings.]

A.D. 1854, November 13.—N° 2402.

ARMSTRONG, Joseph. — " Improvements in chairs and " crossings for the permanent way of railways."

" A more efficient mode than heretofore practised of securing " the crossing rails employed for directing and guiding a train of " railway carriages from one line of rails to another."

" In forming several chairs in one piece of metal, constituting " a compound chair, instead of employing separate chairs; and " in arranging the bearing parts thereof at suitable distances " asunder, and connecting such parts all together by casting " them with the base plate, thereby forming one entire casting, by " the use and employment of which a considerably larger amount " bearing surface for the rails is obtained, and consequently more " solidity and durability of the crossing rails than if single or " separate chairs were employed as commonly practised; and, " secondly, in forming the middle portion of the said compound " chair in such manner and of such shape as that the flanches of " the wheels of the carriages bear slightly thereon, for the purpose " of preventing the point of the crossing from becoming worn, as " is now the case, and by which the even surface of such said " part becomes soon destroyed, and the point thereby rendered " useless."

[Printed, 6*d*. Drawing.]

A.D. 1854, November 23.—N° 2469.

HURST, William.—(*Provisional protection only.*)—" Improvements in railway chairs."

"The nature of the invention consists in rolling iron of a
" peculiar shape, and in cutting the iron thus rolled into pieces
" of suitable length to make railway chairs. The chair thus
" made has a bottom plate, which is fastened to the sleeper in the
" ordinary manner, and a projecting flange for supporting a double-
" headed rail, or rail of other suitable shape. These chairs are
" particularly applicable in those places where the rails are jointed,
" the end of each rail being secured to the flange of the chair by
" bolts and by a fish plate; they may, however, be used as inter-
" mediate chairs. Instead of rolling the iron, the required shape
" may be given to the flange against which the rail is fixed by
" stamping by or pressure."

[Printed, 4*d*. No Drawing.]

A.D. 1854, November 30.—N° 2514.

ANDERSON, SIR JAMES CALEB.—(*Provisional protection only.*)
—" An economical railway for the conveyance of passengers,
" goods, and letters."

Exactly the same as in his former specification:—

A.D. 1854, June 19.—N° 1329.

[Printed, 4*d*. No Drawing.]

A.D. 1854, December 2.—N° 2536.

BAZAINE, DOMINIQUE.—" An improved system of railway
" applicable especially on common roads."

It consists in wrought-iron rails, of a particular shape, provided with a wheel rut, and a counter rail at the top, for the passage of the flange at the rim of the wheel. These rails rest on cast-iron chairs, which chairs are riveted on wrought-iron cross sleepers or merely made fast to stone blocks. The cast-iron chairs may also be made fast to cross sleepers of wood.

[Printed, 2*s*. 6*d*. Drawing.]

A.D. 1854, December 23.—N° 2718.

HARFREY, CHARLES.—(*A communication from Signor Pasquale Delorenzi.*)—" Improvements in the construction of railways for
" steep gradients and in the machinery or apparatus employed
" therein or connected therewith."

"The improvements consist in the utilising or employing of

" water as a propelling force, in which a stream of water is " directed down the line of railway in one or more channels or " ducts, situated either between the rails or on each or either side " of the same, and acting upon a locomotive water wheel or " wheels, or other locomotive hydraulic mechanism attached to " the locomotive. The locomotive to be employed on this description of railway may consist of one or more water wheels, " the floats of which are wholly or partially submerged in the " descending body or stream of water flowing in the channel or " channels, and receive a rotatory motion therefrom."

The patentee says, " It is obvious that the same power which " facilitates the ascent of steep gradients will answer equally well " as a retarding force in descending such gradients, as the weight of " the descending body of water will act upon the floats of the " water wheel or wheels, and tend to turn such wheels round in a " contrary direction to the motion of the train."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1854, December 30.—N° 2760.

NORTH, ROBERT SAM.—" Improvements in switches and crossings for railways."

" Firstly, in making the stock rail for the switches of such a " section as to give it additional strength, to prevent it splitting " with the wheels passing over it, and also that it may be reversed " when one side is worn or injured, and by giving additional " support to the switches."

" Secondly, by making the tongue also of a particular section, " that it may also be reversed when one side is worn."

" Thirdly, by making a chair for the tongue of the switches to " work in of such a form that the tongue is kept much firmer " than the ordinary chair, and at the same time allowing it work " perfectly free.

" Fourthly, by forming a piece of cast iron, steel, wrought iron, " or cast malleable iron, so that the point, point rails, and wing " rails can be fixed to it in such a manner that each and every " piece may be replaced or turned either wholly or separately " when they are worn out or injured."

" Fifthly, for using the crossings without chairs."

[Expired 7th year. Printed, 10*d*. Drawing.]

1855.

A.D. 1855, January 12.—N° 88.

BARNINGHAM, William.—" Improvements in connecting the " rails of railways."

The object of the invention is to afford a large bearing surface for, and a secure connection of the ends of railway rails. The improved chair, by which the rails are supported and connected at their joint, is put together in two halves, the joint being under and in a line with the rail. The chair is made long enough to reach on to two sleepers when the same are placed at the usual distance apart and the two halves of the chair are bolted together, either through the metal which fits between the head and lower portion of the rail or under the rail, as may be found more convenient. The chairs are fixed to the sleepers by spikes or treenails in the usual manner, or the chairs may be made of wrought iron in one piece, instead of bolting them together in two halves.

[Expired 7th year. Printed, 8*d*. Drawing.]

A.D. 1855, January 22.—N° 164.

CARR, Henry.—" Certain improvements in railway crossings."

"The constructing railway carriages with the point, the " distance pieces between the wing rails, and the bed of the crossing which rests upon the sleepers or chairs, of one solid piece of " metal, which piece is somewhat similar to, and partly answers " the purpose of the cast crossing called in America the frog. " The wing rails are formed of the common rails according to the " section used on the line of railway to which the crossing is applied. " These wing rails are brought forward on each side of the solid " point, and attached to it by means of bolts, keys, or similar fastenings, the object being thoroughly to unite the solid point with " the wing rails, as is the case in the American frog."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1855, January 23.—N° 172.

COATES, John.—"Improvements in railways."

The invention refers to the joining or supporting of rails. The chair is cast so that one side of the cored part thereof is of a form corresponding to the section of the rail, a space being left on the other side for the reception of a block, also corresponding to the said section. This block is provided with a groove, in which a key or wedge is placed, a portion thereof also projecting into the chair. Upon the key or wedge therefore being driven up, the block will be pressed firmly against the rail or rails, so as to confine them between it and the cored part of the chair. In order to prevent a longitudinal motion of the block, a projection is formed thereon, which drops into a recess formed in the bottom of the chair. Also in the application of screws or nuts for preventing the keys or wedges of railway chairs from "drawing" upon the end of the key or wedge, a screw is formed which projects beyond the chair, and keep the same drawn forward by means of a nut or nuts; or the side of the chair is taped, and a screw therein is caused to bear against the key or wedge.

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1855, February 8.—N° 300.

ARMSTRONG, Joseph.—(*Provisional protection only.*)—"Im-" "provements in certain parts of the permanent way of railways."

"In connecting by their ends the rails of railways. Those " chairs which are to support the rails at their points of junction " are formed considerably longer than usual, and with a taper " opening through the same, of corresponding shape to the section " of the rail which is to be held thereby, and into such said opening " a wedge is fitted the inner surface of which is of corresponding " shape to the sides and head of the rails, and the outer surface " is formed taper and of corresponding shape to the taper opening " in the chair, and the thickest end of the wedge is formed with a " a flanch, in which are formed holes through which are passed " the screwed ends of two wrought-iron bolts, the barrels and heads " of which are securely held by holes formed through the chair in " the direction of its length and at opposite sides thereof; said " hollow wedge being connected to the chair and rails by nuts " passed upon the screwed ends of the before-mentioned bolts, so " that as the said nuts are tightened up the hollow taper wedge will " be forcibly pressed against the sides of the two rails and thus hold " them firm and steady, and preserve their points of junction in a " line with the top of the rails."

[Printed, 4*d*. No Drawings.]

A.D. 1855, February 21.—N° 379.

TELLE, Julien Aimable.—(*Provisional protection only.*)—" A " system of railways to be used in the interior of cities and towns."

" The invention relates to several improved modes for establishing " railways in streets of towns without obstructing the throughfares " or otherwise interfering with public circulation, by making " through the quarters through which the railway is to pass a " deep cutting, in which is laid down one or several lines of rail " as may be desired. Along this cutting is built on one or both " sides a row of houses which come close to the railway, in such " manner that they may be used for letting passengers get in and " out, and for loading and unloading the goods. The railway " when not laid down in a cutting as described is supported at a " suitable elevation above the level of the street on a succession " of arches, by means of which the smaller crossings are effected, " the larger ones, such as main streets, canals, &c., requiring " bridges."

[Printed, 4*d*. No Drawings.]

A.D. 1855, February 21.—N° 389.

PRINCE, Paul.—" An improvement in the patterns employed " in making moulds for railway chairs."

" This invention consists of making each pattern of a railway " chair of two parts connected by a hinge or axis, by which when " a mould has been formed on the pattern, one part of the pattern " may be caused to move on its axis, and thus admit of " the pattern being more conveniently taken from the mould."

[Printed, 10*d*. Drawing.]

A.D. 1855, March 26.—N° 658.

NORTH, Robert Sam.—(*Provisional protection only.*)—" Improvements in the permanent way and sidings of railways."

" Firstly, in making the rails in two or more parts longitudinally, " and bolting them firmly together so as to form a continuous " rail."

" Secondly, in making that part of the rail on which the wheels " run of such a shape as to suit exactly the periphery of the " wheels, by which splitting or laminating of the flanges is " prevented. And also in giving a continuous support under the "flange of the rail by means of angular pieces, which form a "continuous chair or support to the rail; by this plan of making "the rails in parts that portion which is worn or damaged can be "removed, and a fresh piece replaced without removing the other "parts."

"Thirdly, in making the rail itself form a stop block, by causing "a part of it to rise on a pivot, and thus allow any carriage or "waggon to enter the siding, but not to leave it until "allowed to do so by the person in charge of the siding."

"Fourthly, in making the sleepers for the rails to rest upon "transversely, and of iron or other suitable metal."

[Printed, 4*d.* No Drawings.]

A.D. 1855, March 28.—Nº 682.

PERRING, JOHN SHAE.—"Improvements in the permanent way "of railways."

The invention relates, firstly, to a method of constructing the chairs of railways, and of applying them to sleepers. The chair is formed in two parts, one of which is provided with a bed plate or plates, by which it is attached to the sleeper or sleepers; the other part forms a clip or loose cheek, which is drawn forcibly towards the other, clipping the rail between them by means of bolts, keys, or other such apparatus. The two portions of the chair extend downward, and in that situation bear against each other.

Secondly, to the construction of railway crossings, the points or tongues of which are constructed in such manner that both sides are alike and fit them into chairs, so that when one side or surface is worn out they can be turned over and used again.

[Expired 3rd year. Printed, 10*d.* Drawings.]

A.D. 1855, April 14.—Nº 825.

ARMSTRONG, JOSEPH, and LIVINGSTON, JOHN.—(*Provisional protection only.*)—"Improvements in certain parts of the "permanent way of railways."

"For the purpose of dispensing with the use of 'switches' or "'points' as heretofore constructed and employed on railways, "the mode commonly practised has been to plane them to a "taper point, and the object of these improvements is to obviate "the necessity for pointing such parts."

"At the crossing a pair of sliding rails are placed, formed either " single or double headed, and each pair are connected securely " together at such distances asunder that the flanges of the " wheels of the carriages may pass clear between them; and that " one end of such sliding rails corresponds with the butt ends of " the crossing and main rails of the permanent way, and the other " end of the butt ends of one of the rails of each, such pair cor- " responds with the butt ends of the rails of the main line only; " and it is at this particular juncture that the action of the sliding " rails takes place, so as to present one or other of the ends " thereof opposite to those of the main rails, whilst the opposite " ends of the sliding rails are securely connected by 'fishing' " or otherwise to the fixed rails which form the crossing and the " main line. An important feature in these improvements con- " sists in rendering the aforesaid sliding rails self-acting, which " is effected by the use and employment of two check rails or " bars securely fixed to the sleepers of the permanent way be- " tween the inner pair of the aforesaid sliding rails. The ends of " these check rails or bars are curved inwards, and are so fixed " with respect to the main rails as that the straight part of such " check rails allow the flanges of the wheels of the carriages to " pass between them and the side of one or other of the sliding " rails, according to the position such said rails occupy with " respect to the fixed rails."

[Printed, 4*d*. No Drawings.]

A.D. 1855, April 16.—N° 832.

ORDISH, Rowland Mason.—(*Provisional protection only.*)— " Certain improvements in the permanent way of railways."

"In constructing the rails with their flanges bent down into a " perpendicular or inclined position at the intermediate parts, by " which means a much greater depth is obtained at those parts, " the strength of the rail is increased. The strength is still " farther increased by rolling the rails with a beading or thick " edge to each flange. A clip or bolt may be employed to confine " the flanges and prevent them from spreading. These rails, " which may be called fish-bellied bridge rails, may be rolled in " the ordinary manner, and afterwards shaped or pressed to the " required form by dies or rollers, or otherwise. These rails being

" fixed on cross sleepers produce a very strong and firm system " of permanent way."

[Printed, 4*d.* No Drawings.]

A.D. 1855, April 18.—N° 849.

WOODHOUSE, Henry.—" Improvements in the construction " of crossings for the permanent way of railways."

The object is so to construct the rails of crossings that when one part of the wing rail is worn away the rail may be reversed, so as to bring another portion of the same rail in the place that had been worn away; also in substituting the check rails for the wing rails, and using them in the same way, the injured wing rails being put in the place of the check rails; for this purpose the bend of the wing rails and check rails must be made equal.

[Expired 7th year. Printed, 6*d.* Drawing.]

A.D. 1855, April 24.—N° 916.

MUIR, Matthew Andrew.—" Improvements in the manufac- " ture or moulding of railway chairs."

"The invention relates to the manufacture or moulding of rail- " way chairs in such manner as to secure superior accuracy in the " form of the finished chairs, together with simplicity in the " details of the moulding apparatus and process. One or more " chairs may be moulded and cast in one box; but when two " chairs are moulded in one box, the pattern chairs which are " preferably formed of metal, are combined according to one " modification with a transverse saddle piece, the whole being so " contrived as to give all the accuracy due to the use of chill " plates whilst the latter are dispensed with."

[Expired 7th year. Printed, 10*d.* Drawing.]

A.D. 1855, May 1.—N° 972.

HUNT, Thomas.—(*Provisional protection only.*)—" Improve- " ments in the permanent ways of railways."

"The improvements relate to forming the rail by dividing its " sectional area or breadth and through its whole length into two " or more separate parts, which parts when put together form a " compound rail, which enables, when laying such rails, to place

" these parts or lengths so as to break joint with each other, and " such parts or lengths, when so fixed by keying, screwing, or " otherwise, will be held compactly together. The longitudinal " and sectional division of the rails may be continued through the " entire depth of the rail, or only partially so, according to the " sectional form of rail employed, or as circumstances may " indicate."

[Printed, 4*d*. No Drawing.]

A.D. 1855, May 23.—N° 1161.

DAVIS, DAVID L.—" An improved method of applying elastic " bearings to railroad chairs and rails."

" In confining the india-rubber between plates upon every side " in such a manner that while it shall be free to yield in a vertical " direction it shall be subjected to no friction between the sur- " faces above and below it, by which means the india-rubber is " protected from the abrasion which has heretofore so speedily " destroyed it."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1855, May 28.—N° 1213

MORRISON, JOHN.—" A new mode of constructing railways " specially intended to be employed for the transit of carriages or " vehicles moved or propelled by human power."

" Firstly, in so constructing a double line of rails as that it shall " present an uneven or undulating surface for the wheels of " carriages or vehicles moved or propelled by human power to run " upon, instead of laying the rails as nearly level as is compatible " with the uneven natural surface of the ground selected for the " construction of the line, as heretofore practised in the construc- " tion of railways upon which locomotive engines are employed."

" And, secondly, in the use and employment of four wheel car- " riages or vehicles of similar construction to those extensively " used on common roads, and well known by the name of pedo- " motive and manu-motive carriages, from the circumstance of " their being moved or propelled by the hands or feet of the " person to be carried."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1855, June 2.—N° 1260.

TAYLOR, James, and SMITH, William.—(*Provisional protection only.*)—" Improvements in the chairs of railways."

"The invention consists of making a joint and middle chair " with one jaw, and in the place of the ordinary wood key to fix a " loose piece of iron by means of bolts or cotters; also of making " ing a chair in two parts, with a jaw on each part, the joint of " the two parts pressing transversely under the rail, both pieces " being bolted together at each end. The object of the said " improvements is to dispense with the wood keys that are at " present used for fixing the rails in the chairs."

[Printed, 4*d.* No Drawings.]

A.D. 1855, June 5.—N° 1286.

NEWTON, William Edward.—(*A communication.*)—(*Provisional protection only.*)—" Improved machinery for rolling bar " iron."

"The principal object of this invention is to roll railroad rails " with three treads or wearing surfaces, so that, as the surfaces " become worn, by simply turning the rail one third round a " second new surface will be presented, and when that is worn a " third surface will be presented, the two surfaces which are not " employed as a tread forming at any time a broad base for the " support of the rail or bar. Such rails with three treads, both " for economy of iron and to facilitate the securing of them " to the cross ties, should be formed with each part like the " ordinary T rail, as it is technically termed, the union of the " three presenting three grooves or channels which cannot be rolled " by any form of projections on either two or four rollers, nor by " three rollers, unless their axis be arranged in a peculiar manner."

"To accomplish the result specified, this invention consists in " the employment of three rollers with their axis arranged in the " lines of an equilateral triangle, so geared as to rotate with equal " velocities, and each having a projecting fillet to produce one of " the grooves between two of the rails or treads and the periphery, " each side of the fillet being so shaped as to produce the form of " one half of two of the rails. The die rollers are constituted in " the form of double cones, the pressing surfaces which form the " rails being at or near the middle of the rollers, which, in order to

" ensure accuracy and steadiness, are all geared together in a
" peculiar manner.

" Both the conical surfaces of each roller are provided with
" teeth, so that each roller is made to gear into and work with the
" other two. By this means not only steadiness of working is
" ensured but any undue strain on the gearing is prevented."

[Printed, 4*d*. No Drawings.]

A.D. 1855, June 6.—N° 1297.

BAINES, WILLIAM.—" Improvements in certain parts of rail-
" ways, and for the methods of manufacturing and constructing
" part of the same."

The switches have an extra thickness formed or left on the upper or top part of their outer sides, commencing at or near that part of the tongue against which the flange of the wheel begins to press, and extending as far as additional strength is required, and bending or projecting outwards, to which the adjacent rails are made conformable, and in order to give the point rails a broad and strong base in cases where it is required. On their inner sides are formed grooves or projections, to which are secured blocks or brackets bearing on the surface of the chairs; and to keep the surfaces lubricated, the blocks or the chairs are chambered or hollowed to receive a sponge or other substance for retaining lubricating matter, which by the movement of the switch tongue is conveyed to and spread over the rubbing surface; and each switch chair has one or more raised surfaces, formed on one or both sides of its inner jaw, which by their construction enable the tongue when sliding over them to clear away every obstruction that might fall between it and the main rail.

The iron or steel which is to form the points of the switches and crossings and the joint plates is taken from the furnace or fire sufficiently hot to be made or shaped in iron moulds or dies on one side, while the other side is acted upon by hammers, rolls, or other suitable pressure, all of which are so constructed as to give the proper forms, tapers, or shapes required; and when the switch tongues are of extra length and less tapered, completed by passing them in the hot state through a pair of rolls, which, as soon as they have formed one part of the tongue parallel are acted upon by the application of a pair of excentric or inclined wheels, rollers, or pulleys, which being put in motion at the point nearest to their axis bear upon the ends or axis of one or both of the rolls, rotate simultaneously, and by their gradually increasing diameter cause the rollers to close proportionately, and thereby give the tongue or point the form or taper required.

[Expired 7th year. Printed, 10*d*. Drawing.]

A.D. 1855, June 11.—N° 1331.

BARRINGTON, WILLIAM, and LE FANU, WILLIAM RICHARD. —(*Provisional protection only.*)—" An improved mode of joining " 'bridge rails' in the permanent way of railway by means of a " fish piece."

" The piece of iron or fish is placed in the hollow part or interior of the rail, and one end or portion of it is rivetted or otherwise firmly secured to one length of rail, and the other end or " portion of it is firmly bolted or otherwise fixed to the other length " of rail, the bolts running horizontally through the piece of iron " or 'fish' and the rail on each side of it."

" The ends of the lengths of rail are laid close together, except " at about every third or fourth joint, where provision is made in " the 'fish piece' for the expansion or counteraction of the rails, " by having the holes in the 'fish' piece made oval, so as to " allow a certain amount of play to the bolts or rivets.

[Printed, 4*d*. No Drawings.]

A.D. 1855, June 12.—N° 1336.

LIEBISCH, JOHN JOSEPH.—" Improvements in rails for railways."

The invention consists of making each rail in two parts, the bottom part having a groove longitudinally, and the top part fitting into the said groove. The bottom part of the rails, being laid on sleepers transverse or longitudinal, may be fastened to them either with or without chairs; in practice they will be found unnecessary, as there will never be a joint completely through the rail, the top parts being so placed that their ends will join about the centres of the bottom parts, thus forming a solid continuous rail; and to prevent the top parts lifting out of the grooves put screw bolts or pins through both parts transversely.

[Expired 3rd year. Printed, 8*d*. Drawings.]

A.D. 1855, June 12.—Nº 1344.

BRANT, John Charles.—"Improvements in laying rails, "chairs, and sleepers for the permanent way of railways."

"In the application of cork of any necessary substance in "various ways to the permanent way of railways; also of using "longitudinal and transverse sleepers tied together so as to form "a continuous line of way on a solid and equal bearing. By "this method of connecting the longitudinal with the transverse "sleepers a great saving is effected in labour, chairs, and sleepers; "the longitudinal sleepers taking the place of four transverse "ones, and the upper part of the longitudinal sleeper being "covered with cork, attached by means of marine glue or other-"wise; also the introduction of cork between the rails and the "chairs, which prevents noise, and the unpleasant jolt at present "experienced in passing over the chairs, causing an easy transit, "preventing the rail biting in the chair, and saving great expense "to the permanent way, and which must necessarily lessen the "wear and tear of the rolling stock, and give a greater amount of "comfort and security to passengers."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1855, June 15.—Nº 1366.

CLAY, William.—"The application of certain descriptions of "bar iron to purposes where great strength or stiffness is "required."

"Bar iron of angular, concave, convex, and other sectional "forms, such as T iron, trough or channel iron, and double T "iron, has been used for various purposes, such as for bracing or "strengthening wooden or other structures, but it has hitherto "been rolled with parallel sides, that is, of the same section "throughout. Now, the present invention relates to the applica-"tion of this kind of bar iron, after being rolled to a taper form, "to various purposes where strength and stiffness are required."

"It is intended to apply the improved taper bar iron for ships' "knees, beams for ships, or other structures, corner pieces for "railway waggons, or any wooden structure where two pieces or "beams of wood are mortised or attached to each other, and "form an angle or corner. Bar iron made in this manner may "also be employed for wrought-iron beams or girders, or ribs for

" wooden or iron ships, and also for making wrought-iron spokes " for railway wheels."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1855, June 26.—N° 1461.

POUILLET, Charles Marie.—(*Provisional protection only.*)— " Certain improvements in railways."

" The invention consists, first, in the employment in the construction of the permanent way of railways, of sleepers supported upon and fixed to what is termed pressure tables or " bearers and of cast-iron chairs."

" Second, in the employment of pressure tables and sleepers in " which apertures are made for placing the rails fixed and held " in position by a key or wedge."

" Third, in joining the ends of the rails by splints or side " pieces placed on each side of the joint, and secured by bolts or " rivets passed through them and the rails."

" And, fourth, in a frame or apparatus for effecting the change " or crossing of from one line or set of rails to another."

[Printed, 6*d*. Drawing.]

A.D. 1855, July 7.—N° 1525.

PYM, John.—(*Provisional protection only.*)—" A new combination of materials suitable for building purposes."

The patentee says, " I take the following materials in the proportion as under:—To five hundredweight of bitumen I add " about five hundredweight of carbonate of lime in powder, " about one pound of sal-ammoniac, and as much coarse sand " or grit as will mix freely with the former materials when heated " in a cauldron; to which I add, as the article may be required " to be more or less solid or tenacious, resin, shellac, glue, or " pitch, the proportions of which may vary according to the purposes to which the article is to be applied."

" To add strength to the combination when used in the manufacture of railway sleepers or other articles of like character, I " mix with it when heated cocoa nut fibre, wood shavings, or " other fibrous substances. I cast the materials in moulds of the " form and size required."

[Printed, 4*d*. No Drawings.]

A.D. 1855, July 11.—N° 1546.

JOHNSON, John Henry.—(*A communication from Pierre Joseph Bertrand Geoffrey.*)—(*Provisional protection only.*)—" Im-" provements in the permanent way of railways, and in carriages " to be used in connection therewith, or on common roads."

" An improved construction or form of rails and sleepers, and " of an improved mode of securing or uniting the rails to the " sleepers, whereby the junction is effected without either chairs, " screw bolts, pins, or wedges, thus materially reducing the cost " of construction. The rails are rolled with a considerably " rounded surface on their working sides, whilst their lower faces " or bearing surfaces are rolled perfectly flat, with a projecting " dovetailed rib running along their entire length. This dove-" tailed rib is slid into and accurately fits a corresponding groove " in the longitudinal sleepers, the rails being thus securely held " therein without any other fastening whatever. The transverse " section of the longitudinal sleepers approaches a trapezoidal " form, the inner sides of such sleepers being vertical, whilst " their outer sides are made to slope outwards from the upper " edge downwards. These sleepers are fitted into suitable recesses " formed in transverse sleepers, which serve as the main founda-" tion or support of the way, and they are secured therein by " wedges or key-pieces."

[Printed, 4*d*. No Drawings.]

A. D. 1855, July 24.—N° 1673.

WESTWOOD, Joseph, and BAILLIE, Robert.—" Improve-" ments in preserving timber-built ships, also timber or wood " and wrought-iron used in situations exposed to the action of " water or of weather."

" Has reference to the preservation of timber, ships, wood, piles " planking, or other timber or wood used in the construction " of piers, docks, wharfs, or foundations; also for railway " sleepers, telegraph poles, tensing posts, and other similar " purposes."

" And consists in applying to the wood or iron used for such " purposes a preparatory coating of black varnish, or other com-" position having similar properties thereto, and afterwards a " coating of asphalte or bituminous composition, whereby the

" latter will be made to adhere with increasing tenacity to the " surface to which it is applied."

" The manner in which the said coatings are applied to the " surfaces intended to be protected by them is as follows :—First, " pay on the varnish composition with a paint brush, and after- " wards pour on the melted asphalte or bitumen on the surface " of the wood or metal; or immerse the wood or metal in the " melted asphalte or bitumen; or take a brush and pay it over " the surface."

[Expired 3rd year. Printed, 4*d.* No Drawings.]

A.D. 1855, August 15.—N° 1850.

NEWTON, ALFRED VINCENT.—(*A communication.*)—" Improved " machinery for manufacturing railroad chairs."

"This invention consists in arranging and combining with a " suitable frame a cam shaft which through a rocking lever " depresses a die that holds fast the metal which is to form a rail- " road chair, while being cut by a pair of roller shears, such shears " being forced upwards by a second lever operated by the same " cam shaft. Also in combination with the said roller shears two " adjustable benders secured at opposite sides of the machine, and " operated by cams on the ends of the cam shaft, for the purpose " of bending over the lips of the chair as they are cut and raised " by the action of the roller shears, so as to give them the form " of the die from which, when the chair is shaped, it is discharged " by the action of a forked rod or plunger."

[Printed, 10*d.* Drawing.]

A.D. 1855, September 8.—N° 2034.

BOUCHERIE, HENRY.—(*Provisional protection only.*)—" Cer- " tain improvements in machinery for impregnating woods with " chemical materials for their preservation and coloration."

" An air-tight vessel or chamber of cylindrical, retangular, or " other form in which the logs or pieces of wood are placed in a " vertical position. On the top of each log or piece is placed a " plate of metal or other suitable material, with a ring or band of " caoutchouc or other flexible substance to connect it with the " wood."

"The liquid may be forced in by pumps or it may descend from

" an elevated reservoir, or it may be forced in by any other
" means."

"Thus for preparing railway sleepers and short pieces of timber
" a vertical position may be adopted, and the apparatus made of
" a height corresponding to the length of the pieces. For masts
" and long pieces of timber a horizontal position may be more con-
" venient, and several short chambers may be united to form one
" long chamber."

"The whole apparatus may be heated, if required, by a steam
" jacket, or by a fire, or otherwise."

[Printed, 4*d*. No Drawings.]

A.D. 1855, September 11.—N° 2053.

BULL, Henry.—" Railway permanent way materials."

To reduce the weight of rails at present in use by at least one half without at all impairing the efficient strength of the line; to do away altogether with the neccesity for chairs and fishing plates; greatly to facilitate the ease by which lines may be laid down; and in the case of furnishing materials for lines abroad from this country to reduce the coast of freight ℔ mile nearly one half, and increase in like proportion the means of carrying the materials.

The rail is to consist of a simple plate of iron, bedded and bolted into longitudinal wooden sleepers, with cross wooden sleepers, or rather tie bars morticed, bracketted, and bolted into and to the longitudinal sleepers.

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1855, September 19.—2113.

BIDDELL, George Arthur.—" Improvements in railway
" crossings."

The patentee says, " these improvements relate to those parts
" of the wing rails of crossings which are subjected to the greatest
" wear, and consist in manufacturing them of cast iron, so that
" the parts subject to wear from the action of the carriage wheels
" shall be very hard; this hardness being produced either by
" using hard white iron, or by the ordinary method of chilling
" cast iron, which is the plan I prefer. If hard white metal be
" used in part in the manufacture of these crossings, whether
" with or without the method for ' chilling,' it should be used in

" the manner I will now describe, viz.:—The surface of the wing " rails upon which the wheels are intended to run should form " the lower portion of the mould, so as to receive the hard white " metal, which must be the first portion poured into the mould; " and immediately afterwards the ordinary metal must be poured " in, so as to form a perfect union of the two kinds of metal."

"The objects to be gained by thus using two different kinds of " cast iron are to ensure a hard wearing surface, and to obtain " greater strength with the same quantity of iron."

"Also in making the bent portions of the wing rails and a considerable portion of the point rails as nearly as practicable one " compact and solid mass of iron, so that their relative positions " are unalterable when once manufactured as herein described, " and perfectly secure against the casualties which so frequently " happen from the effects of ignorance, carelessness, and neglect."

[Printed, 10*d.* Drawing.]

A.D. 1855, September 27.—N° 2155.

POIGNAND, François Xavier.—(*A communication.*)—"Improvements in the manufacture of wedges and keys."

"Whereas wedges and keys used for fixing rails in their chairs " and for other similar purposes have been hitherto made by being " cut out by a circular saw according to a line first traced " out on the wood, and then planed off by hand to the size " and shape required. By the invention, wedges and keys are " made entirely by machinery and dispensing with the operation " of first tracing them out upon the wood. Suitable blanks are " first sawn of the required length by a circular saw; they are " then fixed in frames upon a revolving platform, where they are " finished by a planing machine. This planing machine consists " of a frame which is fitted with two sets of plane irons placed in " opposite directions. The planes are moved to and fro by a connecting rod attached to an excentric upon the shaft of a fly " wheel or to a crank. Various forms may be given to the plane " irons according to the required shape of the finished wedge."

[Expired 3rd year. Printed, 6*d.* Drawings.]

A.D. 1855, October 2.—N° 2192.

SANDS, Alexander.—"Improvements in securing rails in railway chairs."

"In securing the rails to the chairs by means of a wedge, driven "vertically between the side of the chair and a block, fitting "between the flanges when a double-headed rail is used. And is "also applicable to any other description of rail that can be "secured to the chair by wedging."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1855, October 5.—N° 2224.

HALKETT, PETER ALEXANDER.—"Improvements in the appli-"cation of motive power to, and in obtaining locomotion for, the "cultivation of land."

"In applying the implements of cultivation required for the "various operations of ploughing, scarifying, sowing, reaping, or "other operation of culture by means of a travelling carriage, "moving on tramways or rails, or on other manufactured ways, "placed in parallel lines across the fields, whereby the said "implements are in their operations always kept at a regulated "height, independent of the small undulations or unevenness of "the ground, or of the firmness or softness of the soil, and whereby "they are also kept from varying to the right or to the left of the "line of onward motion. For this purpose permanent ways are "laid down, dividing the fields or pieces of land in a number of "parallel lines, the whole being placed equidistant from each "other. The gauge or width between these lines is made as "wide as possible consistent with the practical application of travel-"ling carriages or platforms to run backwards and forwards "thereon, in order to diminish the cost of rails, as also the extent "of space occupied bo such permanent way. To these travelling "platforms are applied or attached the implement or implements "to operate on the soil, their operation being regulated, if neces-"sary, by an attendant or attendants, who travel on the platform."

[Expired 7th year. Printed, 1*s*. 6*d*. Drawings.]

A.D. 1855, October 12.—N° 2286.

LIVINGSTONE, JOHN.—(*Provisional protection only.*)—"Im-"provements in certain parts of the permanent way of railways."

Exactly the same as in the specification N° 825, April 14, 1855. Vide page 211.

A.D. 1855, October 17.—N° 2319.

BESSEMER, Henry.—"Improvements in the manufacture of railway bars."

The patentee says, "In carrying my said invention into practical operation, I take, by preference, refined iron, and put it into the ordinary puddling furnace, where it is at first treated in the usual way, being raked about until it has thrown off the greater part of its carbon; but care should be taken not to carry this too far; about one per cent. of carbon should be retained." It is then "allowed to cool; these products may be mixed in large quantities to equalize the quality, or it may be drawn into fire-clay crucibles, arranged in furnaces such as are now commonly employed for melting steel. A little charcoal or other carbonaceous matters are to be thrown into the crucibles among the pieces of metal, which will assist in reducing the oxide formed by the previous operation." "When this method is employed a very 'mild' steel is obtained, containing very little carbon, and partaking of the quality of wrought iron in toughness, and is in consequence well calculated to stand the powerful shocks to which rails are sometimes exposed; in any case the rails after they are rolled should be annealed, or allowed to cool slowly, in order that they may retain as much toughness as possible."

[Printed, 4*d*. No Drawings.]

A.D. 1855, October 19.—N° 2349.

FIELD, William, and JEFFREYS.—"Improved means for securing the rails of railways in their chairs or bearings."

"This invention relates to a novel mode of wedging up or fixing the rails of railways in the chair, whereby not only will the rails be securely attached to the chairs, but the butt ends of adjoining rails will be held firmly in position, and thus even unyielding joints will be ensured without the necessity for 'fishing' or splicing the rails together."

"If, therefore, the rails were, by reason of a heavy train passing rapidly over them, to spring in their chair, the one end of the rail could not rise or sink without the other. In order to prevent the cottar or tapered wedge from working loose, ratchet teeth are formed upon its upper edge, into which takes a spring

" catch which is attached to the upper piece, by its being cast on " to the spring catch, or otherwise connected with it. When, " therefore, the cottar is driven in, the spring catch will catch on " to the ratchet teeth, and retain it in its place. But when it is " required to displace the wedge, in order to turn the rails or " readjust the chair the spring catch must be raised, and the " wedge can then be driven out with the same facility as the " common wedge."

[Expired 3rd year. Printed, 1*s*. 2*d*. Drawings.]

A.D. 1855, November 1.—N° 2444.

NORMANDY, Lewis.—(*A communication.*)—" Improvements " in securing the rails in railways."

"The invention consists in substituting rolled iron railway " chairs to cast iron ones. The intermediate chairs of the said " system serve to support the rail, and the joint chairs are long " enough to unite firmly together the joining ends of rails so as " to dispense with the use of splints. Each of the said chairs fits " perfectly the mushroom-shaped base of the rail."

" For this purpose the piece should be rolled of nearly the required " size, and then put red hot in situ. The required tightening may " also be obtained by means of the screw bolt uniting together " both the jaws of the chair and the rail. Instead of a screw bolt a " rivet may be used. For manufacturing the chairs according to " the above-mentioned plan, bars of iron are rolled in the repuired " shape between suitable rollers. The bars thus obtained have a " sole and two straight jaws. The said bars are then cut into " pieces of the required length, either by means of a circular saw, " when still hot, or by placing them on a lathe similar to those used " for cutting the rails. When this first operation is finished, the " pieces are put again in the fire, if necessary, and they are shaped " by means of a tilt, or of a steam hammer, or of a press on a " mandril, so as to give the jaws the form, so that they may clasp " accurately the footing of the rail."

[Expired 3rd year. Printed, 10*d*. Drawings.]

A.D. 1855, November 7.—N° 2508.

POUILLET, Charles Marie.—" Certain improvements in rail- " ways."

" First, in the employment, in the construction of the permanent

" way of railways, of sleepers supported upon and fixed to what " are termed pressure tables or bearers, and provide with cast " iron or other chairs."

" Second, in a new description of iron railway chair."

" Third, in arrangements for joining the ends of rails by splints " or side plates, secured by bolts, rivets, or clamping, and also for " fixing the rails to the sleepers by clamps, bolts, or screws."

" Fourth in the employment of pressure tables and sleepers, in " which apertures are formed to receive the rails, whereby chairs " are dispensed with."

" Fifth, in a frame or apparatus for effecting the changing or " crossing from one line of rail to another."

" And, sixth, in the employment, in the construction of the " permanent way of railways, of girders with pressure tables " or bearers to support flat-bottomed rails."

[Expired 3rd year. Printed, 1*s.* 4*d.* Drawings.]

A.D. 1855, November 14.—N° 2563.

BARNES, William.—" An improvement in connecting and " supporting the ends of the rails of railways."

" For this purpose the end of each railway bar is formed or cut " with a slit or opening in order to receive a filing and connecting " piece, which is formed in such manner as to enter horizontally " into the slit or opening formed in either of two contiguous " railway bars, and to be slided partly therefrom into the slit " or opening at the end of the other bar, and by such means " to retain the ends of the two bars to the same level; and in " order to prevent either of the ends so connected from shifting " laterally, the filling and connecting piece is made with projecting " flanges, which come on either side of the two railway bars, and " they prevent the ends shifting laterally or separating one from the " other in either direction. The filling or connecting piece is " retained from moving by keys or fastenings. By these means " the ends of the rails will be securely upheld and retained " secure, and yet admit of being readily taken up and replaced."

[Expired 3rd year. Printed, 8*d.* Drawing.]

A.D. 1855, November 17.—N° 2596.

SHAW, Joseph.—" Improvements in the prevention of accidents " arising from collisions on railways."

"Firstly, in rendering available the steam from the boiler of a "locomotive engine, and employing the same in a separate "cylinder for actuating the brakes of the several carriages com- "posing a railway train."

"Secondly, in the use and employment of metal rods and shafts "arranged and disposed along a line of railway, and actuated by "cranks or levers affixed to such said rods, the use of said rods "and levers or cranks which are in connection with the aforesaid "rods so as to sound a bell or whistle, and thereby give notice to "a train when approaching too near another train in front thereof, "and by these means to render the operation of signalizing self- "acting, and thus prevent accidents arising from collisions on "railways."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1855, November 21.—N° 2627.

MUNSLOW, WILLIAM and WALLWORK, HENRY.—"Im- "provements in railways."

The invention relates to a method of restoring the proper position of the rail when that part of the chair upon which it beds shall have become worn. For this purpose we adapt to the chair a loose piece or pieces which may be removed at pleasure.

These loose pieces may be of any desired shape; but a particular method adopted is to form them of corresponding section to one or both sides of the rail, as well as to the bottom thereof; the two sides being, therefore, drawn together by bolts, keys, or other ordinary fastenings will constitute a clip by which the rail may be grasped; or if one side only be provided with the loose piece, the rail may be forced against it by any ordinary means.

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1855, November 23.—N° 2645.

JOBSON, JOHN.—"Improvements in the manufacture of railway "chairs."

The patentee says, "The railway chairs in ordinary use have "two jaws, one and sometimes both of which overhang, so that "the pattern cannot be drawn directly out of the sand in which "the chair is moulded. Various methods are therefore employed "to overcome this difficulty, and to mould the overhanging parts.

" By my invention I effect the required object by constructing a " sliding piece in the jaw of the pattern which forms the upper " portion of the overhanging part, and is drawn back in a " diagonal direction after the sand has been rammed round the " pattern. A space or cavity is thus left, into which the lower " portion of the overhanging part of the jaw is turned back, " this lower portion being mounted upon a pin or hinge for " that purpose. The sliding piece is made to give the required " motion to the hinge piece, so that by merely drawing back the " sliding piece the whole of the overhanging part of the jaw is " relieved and withdrawn from the sand into such a position " that the sand mould can be lifted at once from off the pattern. " If an overhanging part is required on the other jaw of the chair, " that jaw is constructed in a similar manner."

[Printed, 3s. 6d. Drawings.]

A.D. 1855, November 29.—N° 2693.

SYMONS, Thomas.—" Improvements in the permanent ways of " railways, and in the wheels rolling thereon."

"The invention consists in the use of a double line of rails, or " twin rails, instead of the single line of rails now used. For " this purpose is placed two H rails side by side, with sufficient " room between them to receive the flanges of the wheels, which " are placed in the middle of the breadth of the wheel, and " allow it to bear upon both sides of the flanges, and consequently " on both rails.

"This is only considered necessary with regard to the engine " wheels, as a bearing on a single rail will be sufficient for " ordinary carriages; in these, however, the flanges on the out- " side are made so that it should bear on the inner rail, the " flanges having a bearing on each side to keep it on the " track. The H rails are fixed together by short bars at the " middle of their depth, and by bolts through such bars are held " down to the sleepers, chairs being altogether dispensed with; " double rails of any other form may be used in lieu of the H rail " before referred to.

" Instead of placing the double or twin rail with the bearing " surfaces at a distance apart, with the driving wheel flange " running between them, the parts of the rails may be placed in " closer proximity, and the flange of that wheel placed on the

" inside of both rails, the wheels at the same time having a " sufficient breadth in the sole or tread to cover and bite through- " out the breadth of both rails.

" Another part of the invention refers to the sleepers, which I " make in pieces, instead of one piece, as now, laid transversely to " the rails.

" The patentee takes five pieces of wood of equal length and " size in cross section, say about eight inches by four inches, and " places two peices on edge under each rail, at a distance apart " equal to the thickness of the fifth piece, which is placed between " the inner ends of each pair, and bolted thereto.

" Instead of being placed on edge the transverse tie piece may " be on its flat, which separates the piece under the rails still " further; on any piece becoming damaged it can be removed " and replaced without the necessity of an entire new sleeper. " This construction of sleeper also presents a good form to hold " in the ballast when well rammed."

[Printed, 1*s.* 4*d.* Drawings. Expired 3rd year.]

A.D. 1855, November 29.—N° 2694.

IRLAM, William.—" Improvements in crossings for rail- " ways."

" The nature of this invention consists, first, in casting the point " and portions of the wing rails with the foundation plate, and " in chilling those parts that are liable to be worn by the action of " the wheels of the carriages passing over the crossing.

" Secondly, in attaching the point to the foundation plate, as " in some other crossings, and in casting flanges with the " foundation plate, to which flanges steel or iron pieces are " attached to form prolongations of the wing rails.

" Thirdly, in placing steel or iron filling-up pieces on the found- " ation plate, so that the flange of the wheels in passing over the " crossing are supported by the said filling-up piece.

" Lastly, in an improved arrangement of compound chairs or " plates for supporting the rails and point of crossings."

[Printed, 10*d.* Drawings. Expired 3rd year.]

A.D. 1855, December 20.—N° 2881.

EVANS, Evan.—" Improvements in combining and fixing rail- " *way* bars."

"This invention consists of using two forms of railway bars, in
" order that by their combined use the bars of a railway may
" be better fixed and the whole rendered more secure. For
" this purpose, what are called trough or bridge rails are employed
" together with other rails, each formed with a web or inter-
" mediate part between the head and foot, or lower part of each
" rail. The hollow of the trough or bridge rails and the webs
" and feet or lower parts of the other rails are made to fit each
" other, so that by removing the head or upper part of a rail
" it may enter the end of the next trough rail and give support
" thereto, and these parts may be fixed together by bolts, or nuts,
" or otherwise, if desired.

"The trough rails are fixed in like manner to what trough
" rails have heretofore been fixed, and the other rails may be
" also similarly fixed, or only short lengths of such other rails
" may be used between two trough rails.

"The patentee claims the combined use of solid and hollow
" rails."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1855, December 21.—N° 2897.

GLOVER, Charles.—"Removing snow from a line of rail-
" ways."

This invention consists of constructing and applying a carriage on flanged wheels, suitable for running on a railway, The carriage is framed strongly together, and the fore part is constructed somewhat similarly to an ordinary plough. There is a horizontal cutting edge of a length somewhat greater than the space between the rails, in order that the snow may be removed not only from the over space between rails, but also on either side of the two rails; there it also an upright cutter in the nature of a coulter, and a mould board. The two cutters divide the snow horizontally and vertically, and the mould board turns over the snow at a distance from the rails.

[Printed, 6*d.* Drawing.]

1856.

A.D. 1856, January 1.—N° 4.

NEWTON, Alfred Vincent.—(*A communication from François Garnier.*)—(*Provisional protection only.*)—" A novel system of pro-" pulsion applicable to land and water."

"The carriage to be propelled, instead of running upon a " railway upon vertical wheels in the ordinary manner is mounted " upon six horizontal wheels, the peripheries of which run in " grooves made in the outsides of the masonry of the road, which " is raised some distance from the ground. These horizontal " wheels are coupled together, and actuated in such a manner " as always to preserve their parallelism with the body of the " carriage. The road upon which the carriage runs is provided " with an atmospheric tube, the upper extremity of which " terminates in plates of a double V form, and which are pressed " together by means of pads furnished with counterweighted " rods. The atmospheric valve is opened by means of a series of " jointed arms outside the road or way, connected by means of an " arrangement of levers with the counter-weighted levers above " mentioned; or instead of counter-weighted levers the atmo-" spheric valve may be kept closed by means of springs, which " will be acted upon from the outside, and open the valve in a " similar manner."

" In order to apply this principle to the propulsion of vessels on " water, the vessel is suspended in a rectangular tubular frame, " to which it is attached by links in such a manner as to be " capable of rising and falling therein. The vessel is provided at " its lower part with an air chamber, and on compressed air being " forced therein by means of a steam engine above, the vessel will " be caused to rise in the frame; the air flowing through this " chamber will make its exit at the back in larger quantity than " in front, and will consequently propel the vessel forward. For " this purpose an engine of only half the power to work the screw " will be required. This arrangement the inventor calls Garnier's " hydro-carriage."

[Printed, 4*d*. No Drawings.]

A.D. 1856, January 15.—N° 108.

HOSTAGE, Joseph, HOSTAGE, Thomas Ives Brayne, and TATLOCK, John.—" Improvements in railway chairs."

" The invention consists in constructing the chair in parts, one " of which is designated the fixed part, having a seat for the rails, " and a cheek or solid abutment to fit the outside of the same, " which fixed part, in the first instance, is spiked to the sleeper " on one side only to the gauge of the railway in the ordinary " manner."

" The other part ofthe chair, which is designated the slide part, " is also formed with a cheek to fit the inside of the rail, and " furnished with a projecting tongue to fit the space or opening in " the 'fixed part' of the chair, and which projects such a dis- " beyond the outside of the cheek in the fixed part as to admit " a wedge or cotter to be driven down vertically through a slot in " the tongue and basement plate of the chair some distance into " the sleeper, the position of the two slot holes being such as to " allow the wedge to draw the whole up tight; the slide and " bottom part are then secured by an ordinary spike driven " through both pieces into the sleeper. A thin piece of felt or " other suitable material is put between the chair and rails where " found necessary, to meet any slight irregularities in the iron " work."

[Expired 7th year. Printed, 8*d*. Drawing.]

A.D. 1856, January 16.—N° 119.

HAMILTON, John, junr.—" Improvements in constructing the " permanent ways of railways."

For this purpose corrugated iron is used, bent into an arched form, in a direction with the corrugations transverse of the railway. In this manner longitudinal bearings are made, and the parts are by preference connected together by rivets or otherwise, so as to form a continuous bearing, and the guage of the longitudinal bearers thus formed of corrugated iron is maintained by ties of wrought or cast iron. The longitudinal bearers of corrugated iron it is preferred should be coated with zinc. On the upper parts of the corrugated continuous bearers, trough or bridge rails are fixed by screws and nuts, or otherwise. In some cases a longitudinal plate of iron is fixed by rivets to the upper surface of the longitudinal corrugated bearers, and the trough or bridge rails are fixed to such plate, or similar bearers may be made and used transversely of a railway.

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1856, January 18.—N° 135.

DE BERGUE, MIGUEL.—" Improvements in the permanent " way of railways."

In so forming the rails with a rib or feather disposed vertically or nearly so, and support the foundation or bearing for the rails with a rib or feather also disposed vertically or nearly so, that the rib or feather of the rail may be placed by the side of and against that of the support, and the two may be bolted or otherwise connected together.

It is preferred that the bottom edge of the rail should rest upon the bearing, but the rail may be formed with a shoulder, so as to rest upon the top of the rib of the bearing.

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1856, January 19.—N° 149.

PICKERING, EDWARD.—" Improvements in the permanent " way of railways."

" In constructing a hollow compound rail and longitudinal " bearer or sleeper of triangular form, and having a rail head or " surface for travelling upon at each of the three angles or edges. " This rail and bearer is bedded in the ballast with one of its " angles uppermost, on which the wheels of the carriages travel. " When one of the edges or rail heads is worn out the compound " sleeper rail is turned, so as to bring another of the angles uppermost, and when this is worn out it is again turned to bring the " other edge uppermost."

[Expired 3rd year. Printed, 1*s*. 10*d*. Drawings.]

A.D. 1856, January 22.—N° 172.

BEECH, JOHN, and JEFFREYS, EDWARD.—(*Provisional protection only.*)—" Improvements in the means of supporting the " rails of railways."

" The invention relates to an improved mode of constructing " the chairs and sleepers of railways, and consists in constructing " these articles of a cruciform or star shape, so as to obtain a

" considerable amount of bearing surface for the sleepers, and " which surface is also arranged that it may be more conveniently " and effectually packed than other sleepers of large bearing " surface.

" The chair and sleeper is formed of one piece and made of " cast iron; this plan is considered most economical and convenient, and which it is proposed to adopt in constructing a new " permanent way; but as many cases may arise in which it may " be desirable to adapt or apply our improvements to lines of " railway in which sleepers of the ordinary kind are already in " use, it is also proposed to construct the chairs alone of a cruciform shape, and fasten the same by pins, bolts, or in any other " convenient manner, on to the ordinary sleepers; and sometimes " adapt these cruciform chairs to sleepers made of a cruciform " shape, on which such chairs may be secured in any convenient " manner."

[Printed, 4*d*. No Drawings.]

A.D. 1856, January 23.—N° 177.

TOLHAUSEN, Alexandre.—(*A communication from James Richard Hilliard.*)—"An improved lock-joint for the rails of " railways."

"The object is to unite the sections of rail in the construction " of railroads by a compound lap joint, so disposed that while " the joints give perfect freedom of end play for the expansion " and contraction due to the changes of temperature, and admit " of separation for the purpose of repairs without the use of " screw bolts, nuts, wedges, or other equivalent devices, and with " no other fastening than by spikes to the cross ties or other bed, " the sections shall be as effectually kept in line as if each rail " was one continuous bar from end to end. And in forming the " joint of one section with another by lapping the one against the " other in a central, longitudinal vertical plane of any desired " length, and extending only a portion of the height of the rail " from the top to within a third of the base, more or less, when " this is combined with the lapping of each section on and under " the other in planes longitudinally parallel with the axis of the " rail, and transversely inclined in opposite directions from the " outside towards the central vertical plane of division of the " first-named laps."

[Expired 3rd year. Printed, 10*d*. Drawings.]

A.D. 1856, January 31.—N° 269.

HURST, Thomas.—"Improvements in the connecting of the "rails or 'metals' generally used on railways."

"By a peculiar mode of 'scarfing' or scarf-jointing lengths of "rails or metals so that the rails or metals shall have bearings "against each other, and upon or against the flange or flanges "thereof, and may or may not be further connected together by "two square or other suitably formed rivets or bolts, to pass "through the scarf-jointing. This not only prevents the vertical "working now found to occur at the joints of the rails, but will "tend to preclude accidents occurring from the joints getting "foul; and renders the line of rail, though composed of many "lengths, as usual, one continuous and complete rail, and allows "the sleepers of the kind now in use being placed at an uniform "distance apart.

"This joint may be made by cutting away the flanges to the "extent required by circular saw, and re-heating the end of the "rail and placing it in a die to press it into form: or the steam "hammer or rolls may be adopted for this purpose."

[Expired 7th year. Printed, 6*d*. Drawing.]

A.D. 1856, February 1.—N° 276.

MOATE, Charles Robert.—"An improvement in securing "and sustaining the rails of railways."

"In holding the rails by a chair rolled in two pieces, of such a "form as that each half of the chair may support upon a solid "bearing the lower flange or bottom of the rail, and receive or "clip the same on either side, and the jaws of the two portions "of the chair being firmly bolted through the middle portion "of the rail, the whole is combined together, effectually fishing "the joint at the lower as well as at the upper flange or head, as "well as supporting that head to resist the lateral strains or "shocks from the railway engines or carriage wheels.'

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1856, February 2.—N° 292.

BURLEIGH, Benjamin.—"Improvements in certain parts of "the permanent way of railways."

"In constructing a hollow key of wrought iron, tapered or "parallel from end to end, of a section to suit the peculiar form

" of rail used. The said key to be made either as an entire tube or " with a slit or opening in the direction of its length, so as to " be slightly compressible when driven in between the rail and " the chair.

" In constructing a pair of wedges to be used with a chair " of improved form, and when inserted between the rail and the " chair, the wedges are made to move from each other in opposite " directions, either by means of a right and left hand screw " or a vertical wedge inserted between their larger ends for the " purpose of forcing them apart and thus fixing the rail.

" In constructing a chair of cast or malleable iron, having a " groove or space in that part below the under side of the rail, " for the purpose of preventing the indentation or notching of " the centre portion of the lower table of the rail.

" In constructing those parts of the crossings called the " 'point rail' and 'flange bearers' in one solid piece, either " of cast or malleable iron, or the same may be made in one " casting with a hollow centre, and in either case be similarly " shaped both on the top and bottom surface; and constructing " the crossing point and flange bearers in parts, such parts being " divided longitudinally by inserting between them bars of steel " or wrought iron, or a combination of both; and so placed as " to bear certain portions of the wheels or their flanges when " passing over the crossings.

" In constructing cast-iron chairs, and also crossings with the " check or guard rails so raised or elevated above the surface of " the main rails as to insure an additional amount of safety to " passing trains.

" In forming the tongue rail of a switch by extending the " projecting portion which bears the flange of a wheel to a point " beyond the hinge joint so that it laps over the adjoining rail, " and being bolted thereto forms a break joint, at the same time " improves the hinge of the switch.

" In constructing the hinge of a switch with a chair either of " wrought or cast iron, having a jaw on one side only against " which the tongue rail lies."

[Printed, 10*d*. Drawings.]

A.D. 1856, February 8.—N° 338.

JOWETT, HENRY ALFRED.—(*Provisional protection only.*)— " Improvements in rails used for the construction of the perma-

" nent way of railways, and in the means of laying down and " fixing them in conjunction with the present rails in use."

" In a novel and improved formation of wrought iron or other " metal rail, which is termed the 'trigone' or rail of three surfaces; for example, instead of the ordinary double or ⊢⊣ rail, " it is proposed to roll or otherwise form a rail with three wearing " surfaces for the wheels to travel upon. Two of these surfaces " to be partially embedded in the wooden sleepers, placed as they " now are in a transverse position, and spiked or bolted through " the angle arms into the said sleepers. By forming rails of the " above shape the use of chairs, wooden keys, &c. is not only " dispensed with but rails are rendered more durable."

" Another construction of rail with four wearing surfaces, to " be formed of a somewhat similar shape to the other rail; but " the wearing surfaces of this rail are on the side where the " flanches of the wheels of the carriages now run or press against " the side rail, and instead of the rail being placed on end, it is " proposed to lay it on the side, two of the wearing surfaces " being imbedded in the sleeper, and a bolt or spike passed " through the centre arm or tie bar of the rail into the sleeper."

[Printed, 4*d*. No Drawings.]

A.D. 1856, February 14.—N° 388.

COWPER, CHARLES.—(*A communication from Henri Boucherie.*) —" Certain improvements in impregnating wood with preservative " and colouring materials, and in apparatus for that purpose."

" The present invention relates to improvements in the method " and apparatus for applying the liquid so as to cause it to percolate through the wood. For this purpose the pieces of wood " are completely inclosed within a close vessel, and one end of " each piece of wood is caused to communicate with the exterior " of the vessel."

" The apparatus may be conveniently employed for saturating " railway sleepers and similar pieces of wood. The apparatus " may be placed in a horizontal or inclined position if more convenient."

" Thus, a long horizontal chamber may be employed for saturating or impregnating railway sleepers and short pieces of wood, " and also for impregnating masts and long pieces of timber."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1856, February 19.—N° 415.

BOWERS, William Henry.—" Improvements in the construction of railways."

" First a sleeper or bearing of plate iron curved into a segment of a circle, and secured from spreading out by a flat tie plate turned up at each side, into which the curved plate is placed, and on the top of which is fastened the rail, either by rivets, bolts or chairs."

" Second, a sleeper or bearing of flat plate iron, under which is fastened T or angle iron, to give vertical strength."

" Third, a sleeper or bearing of a rectangular or circular plate having one or more ribs on its under side to give vertical strength."

" Fourth, a sleeper or bearing of a circular plate, corrugated to give vertical strength, the corrugations being circular with the plate or radiating from its centre."

" Fifth, to support the rails in corrugated bearings a portion of the plate is punched out crossways with the corrugations and the rail is inserted in the openings, which is thus supported without the use of the ordinary fastenings."

" Sixth, constructing a rail to carry its own bearings or sleepers, the section of which is similar to a common girder, the top flange forming the rail, and the bottom flange having sufficient breadth or bearing to form the sleeper."

" Seventh, forming a clip or fish joint for securing the ends of rails; it is made in one piece of metal, and consists of two side plates connected by a crosspiece, which obviates the necessity for bolts and the danger attending their getting loose."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1856, February 20.—N° 430.

BROOMAN, Richard Archibald.—(*A communication from A. Dumas.*)—(*Provisional protection only.*)— " Improvements in working railway switches and crossings, and certain indicating apparatus for preventing accidents on railways."

" Firstly, in working railway switches and crossings from the locomotive, instead of from the road."

" And, secondly, in a tell-tale or clock-work index for indicating the passage of every train and the time elapsed since its passage,

" which consists of an apparatus fitted with a dial and pointer, " worked by clock work and the passage of a train. And a disc " marked with figures is worked also by the passage of the train, " and exhibits in front of the apparatus the number of trains " which have passed."

[Printed, 4*d.* No Drawings.]

A.D. 1856, February 25.—N° 474.

NORMANDY, Louis.—(*A communication from Louis D'Aubrèville.*)—" Improvements in the mode of constructing and fixing " the rails of railways."

" In substituting longitudinal rolled iron sleepers to the " wooden cross or longitudinal ones now in use for laying the " rails in the construction of the permanent way of railways, " such sleepers being united from place to place by cross sleepers " or transverse, made also of suitably I shaped rolled iron, the " whole forming a compact body resting directly on the ballast."

The patentee says, " The advantage consists in the facility of " replacing worn out rails without replacing the sleepers, and " because it is thus possible to use for the rails rough steel or iron " of a harder kind than is commonly employed, and, in the new " lines to be established, the rails are much lighter than those in " ordinary use."

[Expired 3rd year. Printed, 8*d.* Drawings.]

A.D. 1856, February 27.—N° 503.

ALLEN, Edward Ellis.—" Improvements in the permanent " ways of railways."

The rails are so formed as to be supported and sustained by longitudinal projecting plates or wings, one on each side of a rail, " the projecting wing or plate on one side is near the upper part " or head of the rail, and the one on the other side is near the " lower part."

" Convenient forms of rails are produced for carrying out the " invention, by making two angle irons, with an enlargement at " the angle of each to form the heads of a rail when two such " are reversed in their positions and are bolted and combined " together."

[Expired 3rd year. Printed, 8*d.* Drawing.]

A.D. 1856, March 4.—N° 547.

CODDÉ, Louis.—(*Provisional protection only.*)—"A system of "submarine communication."

"In a mode of constructing submarine railways iron tubes are "employed, which, when united together, form a single continuous "tube, in which the railway is to pass. The tubes are prvoided "internally at proper intervals with joints. To prevent water "from entering the tubes when being sunk and previous to their "junction the extremities are closed with an iron plate screwed or "bolted to the joints, with which one of the extremities of each "of the tubes is provided."

One plate is concave and the other convex. "By this arrange"ment, when the tubes are united together, the plates fit into "each other completely, and the tubes being screwed or bolted to "the joint, the interior of the tubes becomes hermetically closed. "When all the tubes are united together the plates are removed and "the rails laid down. The external surface of the tubes is coated "with hydraulic cement, and, as a further precaution, previous "to applying the cement, gutta percha, or other analogous sub"stance, may be laid over the points of junction of the pipes. "When the depth of the sea renders it impracticable to place "the railway on the bottom, the tubes may be supported in sec"tions on floats, placed at the necessary parts, and the usual "means of suspension are employed."

[Printed, 6*d*. Drawing.]

A.D. 1856, March 5.—N° 556.

BILLINTON, William.—"An improved method of treating "wooden railway sleepers."

"In applying by suitable machinery longitudinal or end pres"sure to wooden railway sleepers after they have been cut into "shape and before they are laid down for use. The length of "time necessary for continuing the pressure will depend on the "state of the wood, if green the pressure must be continued "longer than if the wood is dry. The beneficial effect will be, "that without saturating with liquids the wood will be rendered "non-absorbent of wet and therefore not liable to decay and "disease."

[Expired 3rd year. Printed, 4*d*. No Drawings.]

A.D. 1856, March 7.—N° 570.

DOWNIE, John.—"Improvements in moulding or shaping "metals or other materials."

"The invention relates to a system or mode of moulding metals "or other materials, wherein the pattern has motion given to it "during moulding so as to effect the finishing of the moulded "surface by mechanical means, leaving nothing to be done by "hand on the withdrawal of the pattern from the moulds. This "system is applicable in moulding a wide range of articles."

[Expired 7th year. Printed, 1s. 4d. Drawings.]

A.D. 1856, March 7.—N° 572.

BROWN, David, and BROWN, William.—"An improvement or improvements in rolling railway switches from railway bars, and in rolling taper ends on other bars requiring the "same."

The patentees say, we heat such portion of the bar as it is wished to taper, leaving the other part cold; we place the end between excentric rolls when at their greatest distance apart, through an opening made by cutting away a portion of one or both of the rolls. The clutch box or gearing mechanism is now made to gear the rolls with the driving power, when the said rolls grasp the heated iron and taper it between their gradually approaching surface. The bar having left the rolls they are thrown out of gear, and brought to rest in such a position that the portion cut away from one or both rolls is opposed to the other roll, in which position the said rolls permit the bar to be again introduced between them. This is repeated until the required taper is obtained. When bars require tapering at both ends, both ends are subjected to the action of the rolls, and we sometimes taper a rail at both ends, and cut it in two pieces so as to make two switches therefrom. A stop is situated in front of the rolls to determine the distance to which the bar is introduced between them, this stop is capable of adjustment. The rolls rotate in such a direction that the bar is delivered back by the said rollers to the workman on that side on which it is introduced. Instead of both rolls being excentric, one only may be so.

[Expired 3rd year. Printed, 8d. Drawings.]

A.D. 1856, March 12.—N° 594.

SPENCER, George.—"Improvements in supporting the rails of "railways."

"Wrought or cast iron corrugated plates are used running "under or along both sides of the rail, on these plates are placed "at intervals short bearers or girders of wrought iron, or short "transverse bearers of corrugated iron, which are to be attached "to the top of such side or bottom bearing plates, and to these "the rails are secured."

[Expired 3rd year. Printed, 10*d.* Drawings.]

A.D. 1856, March 14.—N° 620.

CLAY, William.—(*Provisional protection only.*)—"Improvements in the manufacture of the points or switches and crossings of railways."

"The present invention relates to the means of producing "tapering bars or points with less labour than is usually required, "and this may be done in two ways, either by rolling down iron "to a taper form and by means of machinery, or by taking iron "bars of a parallel or nearly parallel form, and by means of circular "saws, or other suitable or convenient contrivances, and cutting "off one of the angles of the bars, so as to bring it into the required form for a point or crossing."

[Printed, 4*d.* No Drawings.]

A.D. 1856, March 18.—N° 643.

ROWLEY, Edward, and HADLEY, John.—"A new or improved method of shaping iron."

A method of giving a taper form to bar iron, whether the said bar iron be plain or angle iron, or T iron, or iron otherwise shaped.

Also, in effecting the said tapering by means of pressure in a die of the exact taper which is to be communicated to the iron. The iron is placed suitably heated in the die and passed under a roll. The pressure of the roll forces the heated iron into the die. When the iron is to be made taper from one end to the other, pressure is first applied to the wide end, and from thence to the narrow end. When the tapering proceeds from the middle towards each end, the pressure is first applied at the middle, and from thence to one end; then again at the middle, and from thence to the other end. Iron shaped thus is applicable for ships' knees, girders for roofs, switch rails for railways, and other purposes where great strength is required.

[Expired 3rd year. Printed, 6*d.* Drawing.]

A.D. 1856, March 19.—N° 653.

LACY, AUGUSTUS DACRE.—"Improvements in certain apparatus for taking up and delivering mail bags and other packages from a railway carriage or carriages whilst the train is in motion."

"The apparatus consists of a bracket or support extending from a post fixed at the side of the line, carrying a bar, which extends in a direction parallel with the line of rails. At the end of this bar is fixed a pair of springs, of such form as to be capable of receiving the ring of the bag or package as it is delivered from the moving carriage, and gradually to offer resistance to its motion until it is passed into a retaining hook and there held. Such retaining hook being connected with a spring, so as to lessen the concussion occasioned by the ring passing into the hook. The apparatus on the carriage or carriages" is the same, "also on the box containing the kind of buffer spring in connection with the hook, there is a socket capable of receiving a kind of neck attached to the bag or package, and there holding the latter after it has been delivered from the moving carriage, or in readiness to be taken up thereby, as the case may be."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1856, March 29.—N° 752.

SANDS, ALEXANDER.—(*Provisional protection only.*)—"Improvements in securing rails in railway chairs, and in the construction of railway chairs."

"In the application of steady pins fixed unto or projecting from railway chairs, and taking into holes or slots in the rails, for the purpose of preventing the longitudinal and upward motion of the rails. These steady pins may be cast on the chairs or introduced into holes cast in the chairs, or made of wrought iron and laid in the mould, so as to be secured by the metal of the chair."

" And in the construction of such railway chairs as are put " together in two parts; one part of the chair is furnished with a " T-headed, or other suitably shaped projection on which the " other part fits, the two parts being connected together by a " vertical key, the action of which causes the two parts of the " chair to bind against and secure the rail; the holes or slots for " the keys and steady pins, and the sides of the loose jaw are " cored out in casting on chills or mandrils."

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 4.—N° 818.

RAMIE, Charles William.—" Improvements in constructing " the permanent way of railways."

"For this purpose ordinary double-headed rails are used, and " to support them and retain them in position, on either side of " the rails are fixed wings or plates which form longitudinal bearers to the rails and are fixed either continuously or at intervals. " The plates or wings are made in the form of angle iron, so that " the edge will, where it is in contact with the web or side of the " rail, lie close thereto and admit of bolts being passed through the " rail and through that portion of the wing or plate in contact therewith, and the plate then comes in contact with the lower head of " the rail, and rests thereon; the plate or wing is then found to incline upwards from the lower part of the rail to the outer edge of " the plate or wing in order to facilitate packing. On the under " sides of these wings or projecting plates are fixed, either at " intervals or continuously, bent plates or angle irons; the flanges " of these come under the rail, and by being fixed by rivets or " otherwise to the wings or projecting plates, are then by screw " or cotter bolts capable of being drawn towards each other, and " not only to form under supports for the rail, but at the same " time cause those parts of the wings or projecting plates to clip " and hold securely on the lower head of the rails."

[Expired 7th year. Printed, 10*d*. Drawing.]

A.D. 1856, April 5.—N° 821.

JONES, James.——(*Provisional protection only.*)—" Improvements in railway chairs, and in the method of securing the rails " to the same."

"The said invention is chiefly applicable to joint chairs, but "may be adapted with advantage to single chairs as well. The "bed of the chair is raised a little in the centre, so that the "centre of the rail only bears upon the said raised part thus "forming a partial bedding instead of a solid one, as is now "generally adopted. By this partial bedding, when the rail is "turned upside down there will be no shoulder left on it, as in "the present case. In jointed chairs two screw bolts are passed "through the side of the chair and the rails, so that one bolt "passes through near to the end of one rail, and the other bolt "passes through near to the end of the other rail, thus keeping "the joint perfectly tight, and preventing the ends of the rails "rising or lifting from the chair. For the purpose of tightening "or wedging the rails in the chair, a wedge or fish is introduced "when necessary, or a shoulder is formed on one side of the "chair so that it can be screwed up with the rails and form a "perfectly tight joint."

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 8.—N° 853.

RANSOME, James Allen, and BIDDELL, George Arthur.—(*Provisional protection only.*)—"Improvements in the manu"facture of railway bars and flanch bearers of railway crossings."

"For these purposes railway bars of the sections desired are to "be cast, which is not new; but in place of simply casting "railway bars of uniform quality or hardness, as heretofore, "the process of casting is so conducted that the surfaces on "which the wheels are to run are to be cast harder than the "other parts of the railway hars, and is done either by chill"casting the wearing surfaces, or else by using different quali"ties of cast iron and running the harder quality into the "moulds to come to the wearing surfaces of the bars. In "making flanch bearers of the crossings of railways, their "wearing or upper surfaces are chill cast, or else they are formed "by running the harder metal into the moulds to come to the wearing surfaces of the bearers and the softer or tougher "metal is run into the moulds to form the other parts of the "bearers."

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 9.—N° 860.

MORRELL, GEORGE FREDERICK.—"Improvements in the "manufacture of railway chairs."

"Cutting sheet iron into suitable shapes and in bending up the "sides to form the jaws of the chairs."

[Printed, 1*s*. Drawings.]

A.D. 1856, April 14.—N° 884.

RICHARDSON, ROBERT.—"Improvements in railway switches."

The patentee says, "I construct the tongue rail of the switch "of a double-headed or other form of rail, the end of which "is bent downwards, and also bent towards the main rail, so "that the upper part of the tongue rail passes partly under "the upper table or flange of the main rail. One side of the "upper part of the tongue rail may be sloped off or removed "by planing or otherwise. When double-headed rails are em-"ployed, both flanges of the tongue rail may pass under the "corresponding flanges of the main rail. By this construction a "strong tongue rail is obtained."

[Expired 7th year. Printed, 10*d*. Drawing.]

A.D. 1856, April 18.—N° 926.

STANSBURY, CHARLES FREDERICK.—(*A communication.*)—(*Provisional protection only.*)—"An improved mode of splicing "and fastening the adjacent ends of the rails of a railway track."

In securing the joints of the rails of the permanent way "by the "employment of splice pieces or beams of wood securely attached "on one or both sides of the rails, such wooden splice pieces "being long enough to extend lengthwise along the rail so as to "cover three or more sills, and wide enough to have a firm bear-"ing upon them and to be securely fastened thereto, the height "of the outer splice piece being limited only by the height of the "rail, it being only necessary that the tread of the passing wheels "shall not come in contact with its upper surface, and the height "of the inside piece being determined by the height of the rail, "and the sizes of the flanges of the wheels, both said splice pieces "being of sufficient strength to bear the heaviest loads without "sensible vertical or lateral deflection."

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 23.—N° 975.

PERRING, JOHN SHAE.—" Improvements in chairs for railways."

"The application to railway chairs of a wedge or key acting by " its own gravity. One side or cheek of the chair is constructed " so as to fit the rail in the usual manner, the other side thereof " acts as a stop at bottom, and is then carried upward at an angle of " not less than seventy degrees with the horizon. Within the " space formed by this angle is applied a loose piece of metal, one " side of which rests upon an inclined plane, and acting thereon " by its own gravity presses by the other side against the face " of the rail, so as to keep it in contact with the opposite cheek " of the chair. In the case of a joint chair it is cast of sufficient " length and of suitable form to use two or more pieces of loose " metal, acting as above described."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1856, April 23.—N° 979.

BROWN, DAVID.—(*Provisional protection only.*)—" A new or " improved method of joining the rails of railways."

" The ends of the rails to be joined are rolled of such a figure " that when they are placed together they shall form a rail of " nearly the ordinary section; that is to say, the two ends of the " rails are of a figure nearly resembling that which would be produced by slitting a rail in a vertical plane, and in the direction " of its length. A rebate or recess" is made " in the inside " vertical face of the end of one of the rails, and a projection on " the other fitting in the said rebate or recess. That part of the " rail situated between the upper and lower heads of the rail is " made of somewhat greater thickness as far as the joint extends."

[Printed, 4*d*. No Drawing.]

A.D. 1856, April 29.—N° 1015.

GREENSHIELDS, THOMAS.—" Improvement in sleepers for " railways."

" In constructing a transverse wooden sleeper, and in order to " obtain the greatest amount of advantage from the elastic quality " of the wood, the bottom of the rail, instead of having about " three inches bearing in a cast-iron chair, has a direct bearing of " *eighteen inches* on wooden blocks, the blocks being made

" eighteen inches long, twelve inches wide, and seven inches " thick. The rail is secured in position by a chair made of " wrought iron, the centre part of the chair being sunk to give " the rail a direct bearing on the wood. The wrought-iron chair " being sunk in the centre and let into the sleeper, gives greater " security, more particularly in passing round curves, as the " chair by this means is not dependent on the pins only to keep " it from shifting."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1856, May 2.—N° 1041.

WAITE, William.—(*Provisional protection only.*)—"An im-" provement in the construction of sleepers and rails for railways."

"First, a groved or rabbitted, or groved and rabitted, or both, " or either bevelled longitudinal sleeper, wholly or partly made of " wood or other suitable material, and constructed of one or more " pieces."

"Second, a retangular iron or other rail, either solid or tubular, " adapted to the above-described sleeper, and fixed thereto by " bolts, screws, or other fastenings."

"Third, a peculiarly constructed rail, of iron or other suitable " material, and being two sides of a square, in form capable of " being reversed or fixed with either of its two outer sides upper-" most, having bevelled or other edges, and otherwise adapted for " fixing by bolts, screws, or other fastenings to the above described " longitudinal sleeper."

"Fourth, a square, triangular, or other form of rail, constructed " of iron or other suitable material, to be adapted to such above " described longitudinal sleeper, and fixed by bolts, screws, or " other fastenings."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 6.—N° 1064.

CURTIS, William Joseph.—(*Provisional protection only.*)—" Improvements in constructing the permanent way of railways."

"This invention has for its object improvements in constructing " the permanent way of railways. For this purpose the longi-" tudinal bearers are made of bitumen, with or without stones or " other matters, and it is preferred that each such bearer should " be of a triangular form with the apex downwards, and it is "recommended that such bearers should be continuous. In "forming these bearers, other longitudinal bearers of iron are "introduced into, and by the cooling and setting of the bitumen "are fixed in the bitumen. These iron bearers when for trough "rails it is preferred should be of the form of a cross, and when "for other forms of rails should be of a T form; but the form of "the longitudinal bearers of iron may be varied, so long as by "their being fixed by the cooling and setting of the bitumen, "they will not only be held securely themselves, but will admit of "the trough or other forms of rails being readily fixed thereto by "screw bolts and nuts, or otherwise, in a manner to admit of the "rails being readily removed and replaced, whilst the longitudinal "bearers of iron remain secure in the bearers formed of bitumen "or bitumen mixed with stones or other hard matters."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 13.—N° 1127.

RAYWOOD, Robert.—(*Provisional protection only.*)—"Improvements in railways."

"The invention relates to the rails used in the permanent way "of railways, and consists in forming the same of two parts, "each having a T-shaped head or edge formed upon it, so that "when they are placed together the two will constitute a continuous rail, having a section corresponding to those now in "general use, by this means the necessity of what is usually "known and termed the 'fish joint' will be obviated. Two "bars of any convenient length, and suitable in width, &c., each "having as before mentioned a T-shaped head or edge; these "bars have also grooves or slots formed in such a manner that "when they are placed side by side one edge of one will take "into the groove of the other, by this means securing them so "as to form the rail as above-mentioned."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 13.—N° 1129.

NEWTON, William Edward.—(*A communication.*)—"Improved machinery for removing snow from railroad tracks."

"And consists in so constructing the snow plough that a "simple inclined plane or wedge will act in the first instance to "*raise up the snow* entirely, and then two vertical surfaces curv-

" ing laterally will press off the snow so elevated on to the top of " the surrounding snow, by which means the lateral packing and " jamming of the snow is avoided effected by the old ploughs, " and the return of the snow after it has been once removed."

[Expired 3rd year. Printed, 6*d*., Drawing.]

A.D. 1856, May 15.—N° 1152.

GREAVES, HUGH.—" Improvements in the permanent way of " railways."

" Sleepers are employed, to which the rails, whether flat-bot- " tomed or foot rails, are rivetted or otherwise secured. These " sleepers are made of cast iron, and in some cases round, oval, " or in the form of a ring; the concave side in all cases is placed " towards the ballast. In some cases the rails and sleepers " forming one line of roadway are connected together by tie " bars, to preserve the guage and angle of the rail. A rib is " cast on the sleeper at right angles to the rail or parallel with " it, or insert a short bar of wrought iron, round which the " metal is run in casting. And on the fish in the inside or " outside is cast a short stud, which fits into a hole in the rail " to prevent its travelling, and the fish on the other side, if of " wrought iron, has a hole punched and a short pin inserted, or " burr raised, fitting the same hole or the hole in the rail, to " prevent the fish from travelling when the key is driven home; " two fish plates, two bolts, and one wooden key between them " are used for securing the joints of rails; or a double jawed " chair and two fish plates secured by a wooden key. In order " the more effectually to equalize and economise the iron of the " tyres of the wheels a rail is employed the stalk of which may be " out of the centre, the inner edge of the working surface of the " rail only being employed as a guide for the wheel flanges, or " the usual section of rails may be employed with a flange added " rising above the working surface on the outside of such rail " to act as a guide, as the wheel flanges now do, so as to bring " into work that part of the tyre which is now turned off and " wasted. For railways laid in streets or at those places on rail- " ways where horses are employed paving blocks of iron are " used in which the rails rest (where rails are required). The " blocks are hollow, of a square or hexagonal or other form, flat " on the surface or nearly so, and packed through a hole in the

" surface of such blocks, and cast with projections on them as " foot hold for the horses."

[Expired 7th year. Printed, 1*s*. Drawing.]

A.D. 1856, May 21.—N° 1207.

HERON, George.—" Improvements in machinery or apparatus " for raising, lowering, moving or transporting heavy bodies."

" This invention relates to certain arrangements and combina- " tions of wheels and pullies, actuated by a piston and piston " rods, or pistons and piston rods, working in one or more cylin- " linders, for the purpose of raising, lowering, hauling or moving " heavy bodies, the required power being derived from steam, " compressed air, gas, water, or other fluids acting upon either " side of a piston or pistons in a cylinder or cylinders. The " object is to obtain a multiplying motion so that a great haul " or lift may be obtained by a comparatively short stroke of the " piston. And for the purpose of turning a crane post or jib " a railway turntable, or such like machinery. Two or more " cylinders with pistons and piston rods may be combined, so as " to vary the power of the machine, by causing the cylinders to " act separately or in conjunction with each other, according to " the degree of power required."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1856, May 26.—N° 1253.

RYE, Wharton.—(*Provisional protection only.*)—" Certain " improvements in fixing or fastening rails or railways in their " chairs."

" In one side of an ordinary cast-iron railway chair is inserted " a wrought-iron screwed nut (or nuts), in which works a screw " bolt (or bolts), the head of such bolt being screwed against an " intermediate block or plate for holding the rail, which block " or plate is so constructed as to fit the outside or shape of the " rail, and dispenses with the use of wooden or other wedges. " Between the rail and the bottom, or that part of the chair upon " which the rail usually rests, a space is left so as to keep the " rail suspended between the side of the chair and the fitting " block or other plate. By this means the under side of the rail is " preserved from wear or injury, nor can the surface of such " *under side* be in any way rendered unavailable for further use,

" which is the case when the rail is allowed to rest or bed upon " the bottom of the chair, as in the ordinary method of fixing or " fastening rails; or, if preferred the rail may rest or bed in the " chair in the ordinary way."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 27.—N° 1265.

TALBOTT, Ebenezer.—(*Provisional protection only.*)—" Improvements in the construction of rails for railways."

" This invention consists in a peculiar construction of split or " compound rails with perfect bearings or flanges, and which " when combined have the required strength and structure of " ordinary railway rails."

" In a transverse section of double webbed or double headed " rails made according to the improvements, the rail is cut " through its centre vertically, without the cut passing through " either the longitudinal or the lateral bearings of the rail, but " diverging at a right angle or thereabouts, and passing out on " the left hand side underneath the top web or flange, and in " like manner on the right hand side above the lower web or " flange, or vice versa. In this manner compound rails are somewhat similar to two bars of T iron, placed side by side in reversed position, and may be bolted at suitable intervals along " their sides for security, and they may be connected with fish " joints or otherwise, as usual."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 27.—N° 1269.

DIMPFEL, Frederick Peter.—" Improvements in constructing the permanent way of railroads."

" This invention relates to a novel mode of connecting the " rails of railways to the wooden sleepers. In place of securing " the rail by means of pins or spikes to the upper surface of a " longitudinal sleeper, the foot of the rail is embedded in the " sleeper by cutting out suitable grooves therein to receive the rails, " and in order to do so the rail is cut longitudinally down the " middle, and by means of a suitably shaped cutting tool grooves or " recesses are cut in the inner side of the two halves of the longitudinal sleeper of such a size and shape to receive the foot of " the rail when the the two halves of the sleeper are brought

" together again. By this means the greater portion of the rail " is enclosed between the sleepers, and the foot thereof rests half " on one half of the sleeper and half on the other half."

" In order to prevent as much as possible the lateral deflection " of the rails, it may be desirable to give one half of the sleeper " a greater elevation than the other half, the lower half being at " the highest elevation compatible with the flange of the traversing railway wheels clearing it, but the other abutting against " the head of the rail. A resisting medium is thus provided " against the lateral pressure of the passing train."

[Expired 3rd year. Printed, 6*d.* Drawings.]

A.D. 1856, May 31.—N° 1294.

SPINK, **DANIEL.**—(*Provisional protection only.*)—" Improve" ments in rails and railways."

" First, in a new form of rail for railways, which may be of the " usual section, transversely, employed on narrow guage lines, " with the difference of having flanges formed on each side, and " rolled out of the rail itself; these flanges or supports are " placed at right angles to the neck of the rail, and equidistant " from the upper and lower faces thereof; and, second, in laying " the rails, which are to be sunk into the ground or ballast, half " way as far as the said side flanges, and either angle iron or bar " iron may be used as braces to keep the line to its proper width " or guage. Timbers and chairs may thus be dispensed with, " and when one face or bearing of the rails is worn, they may be " reversed."

[Printed, 4*d.* No Drawings.]

A.D. 1856, June 6.—N° 1346.

ROBINSON, **JOSEPH.**—(*Provisional protection only.*)—"Im" provements in railway chairs, or in means for securing rails " thereto."

" In employing for securing rails to their chairs an axis having " an eccentric formed on it, which occupies the position of the " wood key commonly used for this purpose. The axis of the " eccentric rests in bearings formed in a loose block, or in bearings formed in the chair, so that when turned its excentric comes " in contact and acts upon a loose block or blocks placed against " the side of the rail, or against the chair, or a loose block placed

" against the jaw of the chair, in such manner as to force the " loose block in which the bearings of its axis rest, or the block " or blocks in contact with it, tightly and firmly against the side " of the rail. The axis of the excentric is prevented from turning " back when tightened by means of a pawl jointed to the chair " or to the block in which the bearings of the excentric rest, " which pawl takes into ratchet teeth in a segment formed on or " fixed to the end of the axis, which may be turned by a wrench " by having a suitable provision made, or by other means."

[Printed, 4*d.* No Drawings.]

A.D. 1856, June 9.—N° 1368.

JOHNSON, John Henry.—(*A communication.*)—" Improve" ments in the construction of rails for railways, and in the mode " of securing the ends of rails for railways."

The rails, which may be of the flat-bottomed or girder form, or of the ordinary **H** or **T** shape, or other convenient pattern, are rolled with slide lugs or flanges at each end and at suitable intervals along the rail, and these flanges at the ends of the rails rest on and fit accurately into dished plates of wrought or cast iron, which are recessed or hollowed in a dovetail form to receive them; or the ends may be secured by a plate of wrought iron beneath the joint, plain or turned up at the lateral edges, and secured by pins or bolts, with or without bridle pieces, or with dog bolts passed through the lugs or flanges, and through the plates, and through or into the sleeper or timber bearing, thus binding the whole together; or the tail ends may be fastened down to the timber bearings without the intervention of an iron plate. The intermediate lugs or flanges are also pinned or bolted to the timber bearers or sleepers, holes or key ways being made in them for that purpose.

Also to a mode of securing rail ends, by dovetailing or interlocking the same, in combination with a chair, in one or two parts, either of wrought or cast iron, and which chair may be so formed as to secure as well as support the rail ends together, in some cases with, in others without, the intervention of screwed bolts, keys, or hollow plugs, which when screwed up or driven hot will by the contraction of the metal in cooling bind together, and render the whole more secure and safe than by the ordinary process adopted.

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1856, June 10.—N° 1378.

PARSONS, Percival Moses.—"Certain improvements in the "permanent way of railways."

Constructing the rails of improved forms, which afford a sufficient amount of bearing surface and vertical stiffness, and at the same time admit of being easily manufactured.

First of a vertical or nearly vertical web, with a bearing flanch branching out from it horizontally on each side, one at a different level from the other. The web is surmounted by a head or table for the wheels to run on, and it may also have one at the bottom.

And second of a vertical web, surmounted by a single head or table. The web is cut through vertically to within a short distance of the head into plates or stripes, which are bent up on each side alternately, so as to form bearing plates, one being left occasionally in its vertical position to sustain lateral pressure.

Constructing the chairs or other supports or connections with an adjusting piece, having a spherical curved or doubly inclined surface fitting against a corresponding surface on the side of the jaw of the chair, support or connection for the key or other fastening, or the rails to bear against in such a manner that it will adjust itself, or admit of adjustment, to the taper of the key or chair, inaccuracies in the castings, or difference in the size of the rails, as also if required to their vertical inclination, and thereby ensure a fair distribution of the strain at each end of the chair, and an equal grip of the two rails when applied at a joint. And constructing the keys and other similar fastenings in two or more parts, fitting together with spherical, curved, or doubly inclined surfaces in a similar manner, so that by varying their relative position, similar results may be obtained. When they are applied to ordinary chairs by these means iron keys and similar fastenings may be used with success.

And also constructing iron keys, and also metal frames to be used in chairs in connection with iron keys, with chambers or recesses filled in with wood, and wood crossways of the grain, to act as a cushion between the metal surfaces, the inside of the chair or adjusting piece is made when such keys or ordinary wood keys are employed with jags or barbs to take into the wood, and thereby afford additional security against the keys withdrawing.

And constructing fish chairs, fish brackets, and other similar *fastenings* with the fishing plates separate from the chairs, brackets, or other medium for connecting them and the rails to the sleepers, but secured together by screw bolts, and constructing the screw bolts and nuts for securing fishing plates, or fish chairs, or brackets to the rails with one or both faces of the thread square with or at any angle greater than 75 degrees with the longitudinal centre of the bolt, and the bearing surface of the heads and nuts of a conical or spherical form, fitting into corresponding recesses in the fishing plates, chairs, or brackets, so as to diminish the strain and wear on the thread and the chance of the nuts getting loose.

[Expired 3rd year. Printed, 1*s*. 6*d*. Drawing.]

A.D. 1856, June 11.—N° 1383.

JAMES, Henry Benson.—" Improvements in moulding metal-" lic castings."

The patentee says, " I propose to mould railway chairs or " other castings with counter sinkings, or with holes or cavities of " any form or shape. In order to effect this, I propose to attach " to the pattern shifting pieces of metal or other substance, of " any form or shape, according to the cavity, perforation, or " moulding required to be produced. These pieces are to work " or slide in grooves made in the pattern, and are to possess pro-" jections or stops corresponding with and fitting into said " grooves (or vice versa), so that when the pattern is raised from " the moulding box nearly to its full height, the stops shall catch " in the ends of the grooves, and so lift the said shifting pieces " out of the mould with the pattern; or the grooves and stops " may be dispensed with, thus allowing the said pieces to remain " in the mould after the pattern has been withdrawn, and then to " be removed from the moulding box previous to the metal " being poured in."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1856, June 16.—N° 1419.

BARLOW, William Henry, and WOODHOUSE, William Henry.—" Improvements in connecting and securing the ends " of rails for railways."

" For these purposes the chairs employed are each made in two " parts. The interior of the chair is formed to receive two 'fish " plates in addition to the rail, and a screw bolt passes through

" the two jaws of the chair, through the rail, and through the " two 'fish' plates; where joint chairs are used the chairs are " made wide, and have two holes through each of the jaws for " screw bolts, so that one bolt passes through the end of each " rail as well as through the 'fish' plates and the jaws of the " chair.

"The 'fish' plates are also bolted to the rails by other screw " bolts passing through them." It is found "advantageous, " when using 'fish' plates in connecting the ends of rails of rail- " ways, to employ plates with two or more female screws therein " in place of separate nuts for each screw bolt used."

[Expired 7th year. Printed, 10*d*. Drawing.]

A.D. 1856, June 17.—N° 1431.

BAYNTON, William.—(*Provisional protection only.*) —" Im- " provements in rolling rails for railways."

" In arranging the rolls for rolling such rails so that each time " that the rail is rolled flat the under side of the rail shall be " brought to a concave or hollow form, which hollow is again " filled when the rail is rolled on edge by the metal which is dis- " placed from the throat of the rail. In this way the flanges of " T rails may be rolled sound when using a quantity of iron " inferior to that now necessary. Sometimes also it is advan- " tageous to hollow in a similar manner the head of the rail, " particularly when the rail is more than usually throated in the " middle."

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 21.—N° 1463.

GILBEE, William Armand. — (*A communication.*) — (*Pro- visional protection only.*)—" Improvements in locomotion on rail- " roads, part of which improvements are also applicable to " ordinary roads."

" First in applying an extra wheel in the middle of the axletree " of the locomotive."

" Secondly in widening the crown of locomotive wheels, and in " the employment of rails of hard wood, fitted close to the iron " rails; these wooden rails present their fibres to the action of the " crown of the wheels, which press on the rails. That part of the

" crown which presses on the wooden rail is provided with small " sharp, conical steel blades, projecting out from the surface " about three-quarters of an inch, more or less, the distance " between the blades being about one inch and a half; these " wooden rails may be used with advantage when horse power is " applied for locomotion on cross roads communicating with " small towns and villages. The wood may be steeped in a solu- " tion of alumina or silicia, by which the rails can be made equal " in hardness to iron, while the first expense will be much " less."

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 24.—N° 1479.

SAXBY, John.—" A mode of working simultaneously the points " and signals of railways at junctions, to prevent accidents."

" By this invention the semaphore signals, the coloured glasses " of the signal lamps, and the 'points' are all actuated by a " single motion of a lever, thus rendering the duties of the signal- " man of the most simple character, and making it impossible for " an accident to arise from the signals and the points differing."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1856, July 2.—N° 1555.

HUMBER, William. — (*Provisional protection only.*)— " Im- " provements in the permanent way of railways."

" In manufacturing chairs with the passage gradually diminished " or tapered in two directions, namely, from the middle of the " chair towards its two opposite sides, the passage being, as here- " tofore, entirely on one side of the rail when fitted in the chair." " Also in manufacturing metallic wedges or keys, which may be " used with the improved chairs, and in securing rails within " such chairs by a pair of wedges (to each chair) distended, sepa- " rated, forced apart, or drawn away from each other in opposite " directions by means of one or more distending wedges, keys, " bolts, or other means of forcing or drawing them into their seats " and there maintaining them, so as to prevent their becoming " loose."

"And, also, in fishing or connecting together the contiguous " ends of two rails, resting in or upon two of the improved chairs " respectively, by means of a fishing plate on one side of the rails,

" having a wedge formed at either end, inclined in the same " manner as above mentioned, and fitting into each chair respec- " tively, and the plate being bolted or secured to one or both " of the rails, a fishing plate on the opposite side of the rail, " being either employed or not employed, as may be preferred."

" Lastly, in securing rails in the improved chairs, or in any " other chairs, by wooden wedges or keys having bolts, rods, or " straps passing through them in the longitudinal direction " of the rails, whereby they may be held and maintained firmly " in their intended position."

[Printed, 4*d*. No Drawings.]

A.D. 1856, July 9.—Nº 1617.

KRUPP, ALFRED.—(*Provisional protection only.*)—" Improve- " ments in the permanent way of railways."

" In forming the rails of railways of two distinct and separate " parts, and making such parts of different metals, to form a rail " that shall combine great strength and durability, while at the " same time the cost is not materially increased."

"The metals used are cast or wrought steel, and cast or " wrought iron, and the manner in which these parts are combined " together so as to form a rail is as follows:—The lower portion " of the rail is formed of cast or wrought iron, of a shape similar " to the ordinary flange rail. The upper surface of this portion " of the rail is either formed with a groove or a portion is cut " away upon one side, or upon both sides, so as to admit of the " upper surface being fitted thereto. This upper surface is made " of steel, either cast steel or wrought steel, or steel of any other " kind that may be adapted for this purpose."

[Printed, 4*d*. No Drawings.]

A.D, 1856, July 10.—Nº 1632.

PRINCE, PAUL.—" Improvements in making moulds for casting " railway chairs and other articles."

" The invention consists of attaching any convenient number of " patterns of railway chairs or other articles to a 'turn-over plate' " part or parts of which may be connected by hinge joints or " slides, to facilitate certain portions of the patterns leaving the " mould. The turn-over plate with the patterns is fixed or " *attached* by joints on one end of a bar, which bar, at a con-

" venient point in its length rests on a bearing joint or hinge " constructed to admit of the bar being moved by its own axis, " vertically and laterally, perpendicular to the centre of motion. " On the other end of the bar is placed a counterpoise or weight " to balance as much of the patterns and turn-over plate as is " required. A circular moulding bench is recommended, the " centre of it to be the point on which the bar rests, the " turn-over plate and patterns extending to and corresponding " with it."

[Expired 7th year. Printed, 10*d.* Drawing.]

A.D. 1856, July 12.—N° 1647.

ADAMS, William Bridges.—" Improvements in the permanent way of railways."

Claims "the construction of rails, either single or double " headed, with one solid and two supplementary webs, bolted, " screwed, or rivetted together, and breaking joint with each other, " the rails being either broad-footed or fixed in chairs, or by " brackets or knees."

"The construction and application of a bar or plate of metal " turned up at the ends to keep the feet of the brackets together."

"The undercutting of the shoulders of the side channels of rails " performed either by cutting machines or by rolling lips, afterwards " pressed inwards with packing bars, for the purpose of reversing " and also for saving thickness on the head of the rail; also, " the pitching upwards of the side wings of the angle brackets " to form channels next the rail heads; also, rolling shoulders on " the upper side of the angle brackets, to give depth to wheel " flanges, with light heads to the rails; also, the single head rail " with undercut channels below and wings pitched upwards."

"Forming upper shoulders to angle brackets against the rail " heads, and turning the edges up or down, or otherwise " strengthening them by thickening, together with the upward " pitch, forming safety treads and breaks for the wheels in case " of their getting off the rail."

" Girder rails formed by cast or wrought T angle brackets, also " the application of planks of timber under the angle brackets " to widen the bearing or to prevent hardness, such planks being " either fixed or loose; also the double-headed girder rail with " enlarged head bearings, to prevent pressing into the longitudinal "timbers, bolted in the side channels, such rails being formed "with a single head." "The construction of girder rails, formed "of a bridge or foot rail with a flat bearing plate, and a vertical "T angle bearer."

"The construction, use, and application of bridge rails with "joint connections or similar rails, the flanges being rolled as "wide as may be desirable for bearing surface, and the wheel "flange running in the channel also of double-headed rails, or "similar rails, laid down flatwise, and connected by joints for "wheels to run in the channels without flanges; also the converse "plan of ribbed rails with double flanges to the wheels, so that "in either case the wheels may be guided by one rail only, while "the opposite wheels may run on plain surfaces."

"The cutting out or pressing square, flat, surfaces on that "portion of the rails which are to be connected by fishes or "brackets, to keep them firm without stress on the bolts."

"Applying supports of elastic steel recessed into chairs for "rails to rest on, and prevent the effects of blows tending to "crystallize the rails."

"Securing the bolts used to connect rails and fishes, or brackets, "or chairs, or angle brackets by wedging, and a peculiar form "of fishes; and the use of rails with square or nearly square "side channels rolled the whole length of the rails, in order to "apply angle bearing plates, break joint, and keyed bolts, and tie "bars of iron similar to those used for girder rails, being used to "connect them."

"The undercut form of bolt heads and nuts, so as to receive "wedges, and the wedges and plates and lock plates, to prevent "the bolts and nuts or screw heads from working loose, and "the conical washer."

"The elastic headed three and four webbed spikes for chairs "and brackets, and the oblong section spikes cut one out of the "other."

[Expired 7th year. Printed, 1*s*. 6*d*. Drawings.]

A.D. 1856, July 30.—N° 1799.

SIEVIER, ROBERT WILLIAM.—"Improvements in preserving "wood from decay and also from destruction by insects."

The patentee says, "My invention consists in subjecting timber "or wood, when saturated with materials used for preserving it,

" to pressure, so as to compress the substance thereof and close " up the intersticial spaces; the result being that the wood is " rendered perfectly impervious to the decaying influence of air " or water, and the attacks of insects, while at the same time it is " rendered more dense and more durable;"

"And the wood or timber, after being treated according to " my invention, is applicable to railway sleepers, to timber for " the construction of bridges, viaducts, breakwaters, ships, and " other objects where strength and durability are desiderata."

[Expired 3rd year. Printed, 4*d.* No Drawing.]

A.D. 1856, July 21.—Nº 1720.

RICHARDSON, Robert, and BILLUPS, Jonathan Edwin.—" Improvements in the permanent way of railways."

" And consists of applying left and right handed screws in " combination when fixing the ends of rails by fishing plates, " also when fixing the parts of chairs or supports together, also " when fixing rails to chairs with or without fishing plates, and " also when fixing rails in chairs by wedges."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1856, August 15.—Nº 1908.

HURRY, Henry Columbus.—" Improvements in railway cross" ings."

" The substitution of the continuation of the main line rail " unbroken through the crossing for the present point and wing " rails, and passing the wheels of carriages, &c., when traversing " a crossing over the main line rail, by which is removed the pre" sent gap or break in the main line, and the consequent danger " and wear and tear.

" A moveable packing is used to fill the space necessary for the " flanges of wheels traversing the continuous rail upon which the " wheels can travel across such space."

"The construction of such packing in such a way that if left " wrong, wheels traversing the continuous rail will pass over such " packing without danger."

"The depression or bending down of the ends of the rails in " such a way as to allow wheels which have not got flanges to " pass along without a sudden drop or blow."

"The construction of an efficient and simple crossing by the

" use of a fixed packing, and the depressed or bent down ends of " the rail."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1856, August 15.—N° 1909.

JOWETT, HENRY ALFRED.—(*Provisional protection only.*)—Improvements in rails and railway chairs, and in the construction " of railways."

" First, as a substitute for the rails in use, (especially the double " or H rail,) a tubular rail is used, of four wearing surfaces, " square in shape or slightly rounded, being one-sixteenth of an " inch higher in the centre, and reduced down to nearly a round " edge."

" Secondly, more than one description of metal is used."

" Thirdly, in the place of the ordinary cast-iron chair it is proposed to employ a plain wrought-iron bracket or angle plate " forged to the shape of the rail, with two or more holes in each " angle, two holes for spikes or bolts to be driven or screwed into " the transverse wooden sleeper, and the two or more holes in the " vertical angle; and through them and the rail is passed a bolt, " and the opposite side screw on a nut joined as in the fish joint, " thereby forming a chair as well as joining rail to rail."

[Printed, 4*d*. No Drawings.]

A.D. 1856, August 18.—N° 1926.

CAMBRIDGE, WILLIAM COLBOURNE. — (*Provisional protection only.*)—" Improvements in the construction of portable railways."

" In adapting to the running wheels of portable engines used " principally for agricultural purposes, or to the running wheels " of various agricultural implements, waggons, carts, or carriages, " of a flexible metallic road or railway composed of sections or " parts of any convenient length, and adapted to the outside of " the wheel in such a manner that the said sections or parts of " the portable railway may, as the carriage, engine, or implement " advances, be laid down on the ground so as to allow the wheels " of the carriage to pass over the same, in the same way that the " wheels of a locomotive engine or railway carriage pass over the " fixed rails of a railway."

[Printed, 4d. No Drawings.]

A.D. 1856, August 30.—N° 2023.

GREGORY, JOHN.—"An improved fish joint, or method of " connecting rails."

"The improvement consists in making the fish in one piece of " a clamp-like form, and sufficiently deep to allow of a wedge or " bearing piece to be inserted between the under side of the rail " and the bottom of the fishing piece; this wedge piece increases " the bearing surface and prevents fouling of the joints."

"The fish piece may be made of cast or malleable iron. Cotter " pins and bolts, or bolts and nuts may be used for fastening " together the fishing piece and the rail ends. The keys or wedges " may be of wood, iron, or any other suitable material."

[Printed, 8*d*. Drawings.]

A.D. 1856, September 1.—N° 2026.

BOWRA, MATTHIAS EDWARD.—" Improvements in the laying " or placing of rails or chairs for railway and other purposes, in " the shape of beds or springs or elastic sleepers."

"In forming an elastic bearing in or under the sleepers em- " ployed in railways, and in enclosing such bearing within a " frame or box, whereby the same is wholly or partially protected " from the atmosphere and external influences, and is prevented " from spreading out."

"And in constructing sleepers of hardened rubber, vulcanite, " or other suitable elastic material."

"When metal springs are employed in lieu of the layers of " elastic material before described, they should be coated with " some preserving material or composition, in order as far as " possible to prevent the oxidation thereof."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1856, September 20.—N° 2213.

RAMMEL, THOMAS WEBSTER.—"Improvements in construct- " ing railways and propelling carriages thereon."

"The construction and working of railways to pass through " cities and towns, and relieve the streets thereof from the effects " of crowded traffic. For these purposes it is constructed on and " supported by pillars, at a height above the heads of persons

" walking on the pavements. The pillars are to be fixed near " the kerb stones of the footways, each line of railway being carried " by a single line of pillars."

"The means of traction or propulsion preferred is the atmo-" spheric, the traction tubes being carried by the pillars."

[Expired 3rd year. Printed, 1*s*. 6*d*. Drawings.]

A.D. 1856, September 20.—N° 2214.

ROBERTS, JOHN, and BEECH, JAMES.—"A new or improved " railway chair."

The chair is made in two pieces, one consisting of a bed plate to be attached to the sleeper, the bed plate carrying a fixed cheek against which one of the vertical sides of the rail bears. A second loose cheek is provided with a dovetail, which dovetail engages in a slide in the bed plate. The bed plate and its fixed cheek are fastened to the sleeper by a railway pin or spike, and the rail being put in its place bears against the fixed cheek. The moveable cheek is now made to engage and slide in the bed plate until it bears against the rail.

The rail is thus held firmly between the fixed and moveable cheeks of the chair, and a pin or spike being passed through the moveable cheek and that part of the bed plate on which the moveable chair and the rail, a layer of felt, leather, or other flexible material may be placed, in order to give the moveable cheek more exact bearing on the rail.

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1856, September 24.—N° 2237.

BARLOW, PETER WILLIAM.—" Improvements in the permanent " way of railways."

"This invention consists in supporting or holding the rails of " railways by means of wooden chairs or supports, such wooden " chairs or supports being placed at intervals on and supported " by iron sleepers; or such wooden chairs may be used in con-" nection with wooden sleepers if preferred."

" It is preferred to make the wooden chairs in two halves, which " are attached to the sleeper and made to nip the rail by means " of diagonal bolts or fastenings passing through the parts of the " chair and into or through the sleeper. By means of these

" diagonal bolts the chairs can be caused to traverse on the sleeper " to adjust the guage when necessary."

"In using with metal chairs made in two halves or parts, and " supporting the rail at intervals, cushions of wood placed on " each side of and under the rail, so that the chairs, in place of " supporting and holding the rail, directly embrace the cushions " of wood by which it is surrounded; and the chairs used with " the cushions of wood by which it is, as above described, may " either be made separate from the sleepers, or they may be cast " on to and form part of metal sleepers."

[Expired 3rd year. Printed, 6*d.* Drawing.]

A.D. 1856, September 25.—N° 2247.

SABATIER, ETIENNE.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

"Switches worked by the driver. In having before and behind " the switches on both sides of the track two rocker arms acting on " the switches by a suitable combination of levers, and in such " manner that whenever the locomotive in passing over the line " lowers the rocker arms of the side towards which the train is " directed, the moveable part of the switch is carried towards the " opposite side of the track, and at the same time rises the rocker " arms of the opposite side in such manner that another locomotive going towards or coming from this opposite side will find the " rocker arms ready to act in the opposite direction. The two rocker " arms of each side of the track rise or descend simultaneously. " A portion of each of the switches is moveable. The locomotive " or the cars are provided at each side with a moveable piece for " lowering the rocker arms."

[Printed, 4*d.* No Drawings.]

A.D. 1856, September 29.—N° 2283.

RAMIE, CHARLES WILLIAM.—" Improvements in constructing " the permanent ways of railways."

The patentee says " My invention consists, firstly, in an improvement upon my patent, dated April 4th 1856, which " improvement consists in using with the wings or plates placed " longitudinally and inclined upwards to form sleepers, chairs or " brackets for securing the rails."

"Secondly, in the application of cross sleepers of malleable iron, " the sides of which incline upwards, and are connected to the rails " either with or without the intervention of chains or brackets."

"Thirdly, in the application of the aforesaid wings or plates, " placed at intervals longitudinally, and alternated with cross " sleepers of malleable iron, the sides of which incline upwards."

"And lastly, in a mode of jointing the ends of the rails where " they abut or come together, by means of a key inserted in " their respective ends, and held in its position by side plates, " thus ensuring the accurate junction of the ends of the rails. The " side plates described are retained in position by and at the same " time form beds for the keys, by which the rails are secured " to the sleepers."

[Expired 3rd year. Printed, 1*s.* 4*d.* Drawings.]

A.D. 1856, October 7.—N° 2339.

SMITH, THOMAS BRIGGS.—(*Provisional protection only.*)—" Improvements in the permanent way of railways, and in the running of railway carriages."

"In combining with the track now used another track upon " which the carriages shall slide, after the manner of sleds, by " forming the rail with two tracks, or by using two distinct sets " of rails, constructed the one for the wheels track and the other " for the sliding track, whether the set consists of one or more " tracks; also in placing the carriages upon runners like sleds; also " in the application of compositions or amalgams to form the surface of the sliding track and the surface of the runners in contact " with the track, so that by the mediation of water or other suitable " lubricator the surfaces shall be made to offer the least friction " in the passage of the carriage over the track."

[Printed, 4*d.* No Drawings.]

A.D. 1856, October 27.—N° 2519.

ALLAN, THOMAS.—" Improvements in the permanent way of " railways."

"In constructing each line of rails in two parts, bolted together, " and united in such a manner that the lengths of each half of " the rail break joint with the lengths forming the corresponding " half. Each separate length is rolled or cast with two flanges in

" the form of girders, one to rest upon or lie level with the ballast " and form the sleeper, and the other to descend vertically into it. " At the junction of the lengths of half rails the small ends of the " girders, both laterally and vertically, are bolted to the corre- " sponding half (to complete the rail) at the broadest and strongest " part thereof in both directions. Lines of rails thus constructed " present a firm and continuous bearing throughout, and form of " themselves perfect 'fish joints.' It will be necessary at inter- " vals to bolt the two lines together by means of tie bars to " ensure their parallelism."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1856, October 28.—N° 2530.

ARMSTRONG, Joseph.—"Improvements in the permanent " way of railways."

The patentee says, "My improvements consist in making the " wing and point rails of crossings all in one piece of cast steel, " or other suitable material, and which are cast or made double " headed, so that when one side is worn out it can be turned over " and used on the other side. I construct the ends of the cross- " ing so that fish plates can be used to connect the crossing to " the rails at each end. My improved crossings are further so " constructed that the flanges of the wheels running thereon take " a bearing in passing off the point rail on to the wing rail."

" Secondly, in constructing a girder rail with two side brackets " or bearing pieces on each side of the rail, the side brackets " forming a taper recess in the side of the rail, wherein corre- " sponding shaped pieces of timber are forced and held in by " bolts, upon which pieces of wood the rails rest."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1856, November 3.—N° 2575.

JOBSON, John.—(*Provisional protection only.*)—"Improve- " ments in the manufacture of railway chairs."

" Improvements in or modifications of apparatus for producing " moulds for casting railway chairs, for which certain letters " patent were granted to J. J. November 23rd, 1855, in which " the patterns were described with sliding pieces, by withdrawing " which recesses were left into which other moveable pieces were " caused to withdraw, so as to admit of the mould being removed

" from the pattern. The last-mentioned moveable pieces were " guided in two different ways, (viz.,) by turning upon pins or by " being mounted upon levers, like a parallel ruler."

" By this invention these parts are controlled by slides or by " slotted plates or other guides, which may be rectilinear, or " angular, or curved, or mixed form, or so constructed and " arranged that the moveable pieces may be made to withdraw in " various directions, as may be required. When an overhanging " part or lip is required on the jaw of the chair, such part is " caused to be withdrawn into a recess in one of the moveable " parts of the pattern, and then they are withdrawn together."

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 4.—N° 2585.

BESSEMER, Henry.—" Improvements in the manufacture of " rails or railway bars and axles."

" The object is to improve the quality of railway bars by the " combination of certain peculiar qualities or kinds of iron or " steel with iron of another kind or quality, and also in the mode " by which such metals are united to form a bar."

" In all cases that part of the railway bar on which the wheel " rolls is formed of malleable cast metal of a quality varying from " and inclusive of hard or highly carbonized steel down to soft " decarbonized iron which is manufactured of unpuddled metals, " such as is described in the specifications of his former patents, " and manufactured by the processes therein described, or by " means analogous thereto."

" The metal preferred to combine with any of the above kinds " of cast malleable iron or steel is a fibrous, tough, laminated bar " iron produced by puddling and rolling or hammering in the " ordinary way, or produced by rolling a pile of puddled iron, " or by rolling or by piling and re-rolling ingots or masses of " cast malleable iron. The mode by which the different qualities " of metal are united is as follows :—

" A bar or slab of puddled bar or twice worked or piled iron " of a suitable size is heated to a red or white heat, and inserted " in an ingot mould either in the centre or at one side of it; the " fluid iron or steel from the converting vessel is then allowed to " flow into the mould, the stream being by preference directed " *against* the hot bar or slab with which it will unite, and may

" then be rolled into the desired sectional form of the kind of " railway bar required, or in lieu of this mode of uniting the cast " and rolled metal, the cast ingot may form part of a pile with " puddle bar, or with previously rolled, or piled, cast, or puddled " metal, or the ingot may first be rolled and then piled with " puddled iron.

" The second part relates to the manufacture of railway axles, " and is to be carried out in a similar manner."

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 5.—Nº 2600.

KEELING, Herbert.—" An improvement in rivetting fish " joints and other parts of the permanent way of railways."

"In punching, drilling, or otherwise forming conical holes, " either round, polygonal, or of other form, in fishing plates used " for securing the ends of rails on railways, and inserting in such " holes rivets or pieces of iron, or other suitable material, of a " cylindrical or other appropriate form, and which it is preferred " to use cold. The rivets should be sufficiently long to project " beyond the outside of the fishing plates, and by hammering " upon the ends of the rivets until they are expanded into the " conical holes the fishing plates become securely fixed to each " other, and hold the rails tightly between them. In order to " facilitate the removal of the fishing plates when required one " end of the rivets is made in the shape of an ordinary bolt or " rivet head, the holes are made parallel in one of the fishing " plates, the other being made conical or tapering. On the " removal of the projecting head the remaining portion of the " rivet may be readily driven out."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1856, November 13.—Nº 2673.

TREEBY, Thomas Wright Gardener.—(*Provisional protection only.*)—" Forming sewers or tunnels and gulleys to sewers."

The patentee says, " I commence at my lowest level, so as the " work proceeds forward the incline, given to cause a proper fall " for the sewage, will allow the whole of the working to be kept " dry; and will also allow the full trucks to run to the place " decided to get rid of the earth. The full trucks will run down

" the incline and bring up the empty ones for re-loading, by " means of an endless chain or rope."

" Should the sewer or tunnel be made all iron or other material, " I claim as my invention the putting it together in different " parts, the joints of such pipes to run transversely and longi- " tudinally, so as to allow them to be taken through the sewer or " tunnel, which cannot be done according to the present way of " pipes being put together, as the joints run transversely only."

[Printed, 4*d*. No Drawing.]

A.D. 1856, November 14.—N° 2681.

COCHRANE, Honbl. William Erskine.—" Improvements in " the permanent way of railways."

" In more effectually and economically securing the ends of the " rails at their junction with each other, by the introduction of a " double key or tongue into the narrow part of the rail, extending " partly into the end of one and partly into the other, and secured " in its place by the common wood wedge, which presses against " it. And an improvement on a cast-iron railway sleeper, for " which a patent was granted, and enrolled March 5th, 1851, " consists in discontinuing the vertical ribs or wooden sleeper " holders cast on the upper surface of the plate, and placing " them below the surface of the said plate. And also lower the " heel or foot of the jaws or moveable rail holders to the under " part of the plate, and in some instance substituting cocoa nut " fibre or other suitable substance to take off the concussion, in " lieu of the wooden sleeper or cushion."

[Printed, 10*d*. Drawing.]

A.D. 1856, November 14.—N° 2695.

BINKS, Christopher.—" Improvements in converting iron " into steel, and in giving a coating of steel to iron."

In converting masses of iron into steel, either wholly or superficially, by the use and application of certain cyanogen compounds or other materials containing and capable of imparting to the iron both nitrogen and carbon or either, according to the quality or composition of the iron operated upon, such converting compounds or materials being sprinkled upon or otherwise applied to the surface of the iron as it passes through the rolling mill or under the hammer, or is subjected to a mechanical action of any other kind, whereby fresh surfaces of the metal are developed and presented to the action of the converting compound till it either wholly or partially converts the iron into steel.

And in effecting the cementation of iron in its conversion into steel, namely, by exposing the iron to the action of certain compounds of cyanogen or of other materials containing and capable of yielding to the heated metal the elements nitrogen and carbon for its complete conversion into steel.

[Expired 3rd year. Printed, 4*d*. No Drawings.]

A.D. 1856, November 18.—N° 2723.

BUTTERWORTH, Richard.—" Improvements in the means of " securing the ends of rails for railways."

" The object is to secure the ends of the rails in such a manner " as to keep the joint perfectly level, and to prevent the possi- " bility of one rail rising above the other."

" The ends of the rail form a 'butt' joint, and in the end of " each a semicircular notch is cut in the web, so that when the " ends are placed together the two notches form a circular hole. " In this a circular key of wrought iron, the same thickness as " the web of the rail, is placed. When the joint is supported in " a chair the ordinary wooden wedge or key, which secures the " ends of the rails in the chair, also keeps the circular key above " named in its place, thus making the joint perfectly secure. " When the joints occur between the chairs, and the rails are " 'fished,' the fishing pieces are provided with three bolt holes " each, the centre bolt passing through a hole in the circular key, " and the outer bolts each passing through a corresponding hole " in the web of the rail near the end thereof. The same effect " would be produced by making the hole and key of another " form. The key also, instead of being loose, may be made of " one piece with the solid side of the chair or with one of the " fishing pieces."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1856, November 20.—N° 2748.

JOYCE, Thomas Francis.—" Improvements in joining, sup- " porting, and strengthening the rails of railways."

The invention consists of a casing to be applied to the lower head and body of the ordinary double-headed rail, for the purpose of forming an effectual junction of the ends of two rails, as well as for supporting and strengthening rails at points where the said rails require strength or support.

Plates of iron are formed of such a figure that when two of them are bolted together by flanges made on them for that purpose, the space between them has the figure of the lower head and body of an ordinary rail.

In applying the invention to rails the two plates are placed on the sides of the rails respectively, and bolted or riveted together at the flanges on the plates which lie against the body of the rail; the last-mentioned bolts pass also through the body of the rail, and firmly secure the said plates and rail together. Sometimes the flanges on the bottoms of the plates are dispensed with, and the plates are made of one piece of metal.

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1856, December 11.—N° 2947.

CAMBRIDGE, William Colborne.—" An improved construc-
" tion of portable railway."

"To each wheel a set of plates or sustaining pieces are adapted,
" made flat on their under face, which severally receive in turn
" the pressure of the wheel as it revolves. These sustaining pieces
" are connected together by being jointed to a double set of levers
" which act as links, and bind all the parts together into an end-
" less railway. At about the middle of the length of the sustain-
" ing pieces, and at either side thereof, lugs are formed to receive
" the junction pins of the levers or links, and they also act as
" guides between which the wheel runs.

"The sustaining pieces are provided with bearing rails to receive
" the pressure of the periphery of the wheel, and being thus sup-
" ported at the middle of their length they are severally free to
" take up a horizontal position, or adjust themselves to the irregu-
" larities of the way, before the pressure of the running wheel
" comes upon them."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1856, December 26.—N° 3065.

IRLAM, William.—" Improvements in the construction of
" railway turntables and weighing cranes."

In making the outer curb or guard of railway turntables of wrought-iron plates, instead of cast iron, also in rivetting or otherwise attaching to such plate chairs to support the annular rail for the turntable to revolve upon; these annular rails may be made of ordinary wrought-iron rails, or of cast iron. The revolving part of the turntable consists of an outer ring made of the usual double-headed rail, or otherwise bearing on the rollers of the live ring, and connected by two wrought-iron girders on which the chairs for the cross rails are fixed. The two girders are united at the centre by means of a cast or wrought iron beam for the centre pin, which is made as usual.

[Printed 1*s.* 4*d.* Drawings.]

A.D. 1856, December 26.—N° 3071.

MITCHELL, William Lawrence. — (*Provisional protection only.*)—" Improvements in railway switch and signal apparatus."

" In constructing railway switch apparatus the two moveable " tongues of the main line and siding or branch are connected " together by a link or rod, which is pin-jointed to each tongue. " In the middle of the link which connects the two tongues is a " slotted opening, in which a crank pin of a crank on an upright " axis works, and by which the position of the tongues may be " altered. On the upper part of the upright axis is a cross head " having curved sides against which a projecting bolt or instrument " on the locomotive engines comes when it is desired to " change the position of the tongues. The projecting bolt or " instrument on the locomotive engine is moveable, so that the " engine man may in passing cause the switch apparatus to be " acted on or not, as required. It may also be put over by " hand."

" In order to act on the signals of railways by the hand or pull-" over levers, the chain, in place of being made fast to the pulley, " passes freely through the pulley, and is kept tight by means of " a weight; hence, when the pulley is moved to wind on the " chain and to give motion to the wire communicating with the " signal, there will be no slack chain to take up, but the chain " and wire in connection therewith will be at the proper tension, " notwithstanding expansion, or contraction, or stretch, and the " extent of movement of the pulley will be constant."

[Printed, 4*d.* No Drawings.]

1857.

A.D. 1857, January 15.—N° 130.

MUIR, MATTHEW ANDREW, and McILWHAM, JAMES.—"Improvements in moulding or shaping metals."

"This invention relates to various mechanical arrangements, " an improved general system or routine of procedure to be " used for moulding or shaping articles in metal of different " kinds. The several improvements are especially adapted for " moulding or shaping railway chairs, and for such manufacture. " The whole of the establishment in which these improvements " are to be carried into practical effect is specially arranged for " the purpose in all its details, from the melting furnace or " cupola to the discharge of the casting from the mould."

[Printed, 1*s*. Drawings.]

A.D. 1857, January 20.—N° 169.

BARLOW, WILLIAM HENRY, and WOODHOUSE, HENRY.—"Improvements in the permanent way of railways," "in a " method of attaching rails to their sleepers, for which purpose " clamps of metal are employed, having their ends turned inwards, so as to embrace the sleeper and pass over and clip the " bottom flange of the rail. These side clamps are secured to the " sleeper by a bolt passing through the clamps and the sleeper, " or otherwise. To support the ends of railway rails when such " ends are 'fished,' two one-jaw chairs are employed, one placed " at each end of the fish plates, and the rails and fish plates are " fastened to the jaw of the chair by means of bolts passing " through them. If flat-bottomed rails are used without chairs, " the fish plates are lengthened so as to let them rest at each " end over the sleepers, or the sleepers are put closer together " with the same object. When transverse sleepers of cast iron " are used, such sleepers are made in halves or portions, which " are coupled or bolted together between the lines of rails. " And when using chairs with transverse sleepers, the under " parts are formed with projecting plates attached thereto, and " *turning* downwards, so as to form a saddle, and fit over the

" sleeper, thus protecting it from damage by the plate-layer's " tools, and extending the bearing surface of the chair on the " sleeper, and the projecting plates may be further extended to " bear on the ballast; and when this is done the size of the " sleeper may be diminished."

[Printed, 10*d.* Drawing.]

A.D. 1857, February 2.—N° 304.

MUIR, Matthew Andrew, and McILWHAM, James.—" Improvements in moulding or shaping metals."

It mainly consists of an improved arrangement for turning the platforms or carrying plates on which patterns of various kinds for castings in iron and other metal are or may be placed, for conducting the operation of moulding or shaping metals.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1857, February 4.—N° 324.

DE BERGUE, Charles.—" Improvements in the method of " or apparatus for laying the permanent way of railways."

"This invention is more especially applicable to that description " of permanent way which is constructed of rails laid upon cast-" iron sleepers, which do not require separate chairs to be fixed " upon them, but consist of sleepers and chairs in one. And in " the fixing together the different parts of a length of permanent " way, preparatory to the laying the same on the ballast. And " in the manufacture and use of a framing which has seatings, " notches, pins, registering studs (adjustable or otherwise), or " other equivalent provision for placing a number of tie bars, " or of sleepers, or of both, in definite positions upon them, " the said seatings, &c., being disposed upon the frame at the " required distances apart from each other, as regards the " length or run forwards, and as regards the gauge (one or " both of them), so that on placing the rails upon the sleepers " whilst in or upon the seatings, &c., they may be bolted, keyed, " or otherwise fixed together, of the required gauge, and " in proper positions, without the troublesome and tedious ad-" justment attendant on the present mode of laying per-" manent way."

[Printed, 10*d.* Drawing.]

A.D. 1857, February 7.—N° 365.

PARSONS, PERCIVAL MOSES.—"Improvements in the per-
" manent way of railways."

"Packings or wedges of wood are arranged and placed in such
" a manner that the end grain or fibre of the wood will be pre-
" sented to receive or sustain the strain or pressure caused by
" securing or supporting the rails, or the weights imposed on
" them, so that the strain or pressure will be intercepted by and
" transferred from the rail to the chair-fastening support or
" sleeper through these blocks, packings, or wedges, in the same
" direction, or nearly so, as that in which the fibres of the wood
" lie."

[Printed, 1*s*. Drawing.]

A.D. 1857, February 14.—N° 444.

MOATE, CHARLES ROBERT.—(*Provisional protection only.*)—
"Improvements in the permanent way of railways."

The invention has reference to the manufacture of cast iron longitudinal sleepers for railways, whether simply sleepers or sleepers and chairs in one and the same piece, and consists in casting or constructing such sleepers and sleeper chairs with the metal disposed in the form of a tube or hollow casting, having a general triangular transverse section.

The improved sleepers and sleeper chairs may be cast either with or without special holes or other adaptation for fixing to them tie bars for preserving the guage.

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 16.—N° 455.

CLARK, WILLIAM.—(*A communication.*)—"Improvements in
" the manufacture of railway chairs."

"Railway chairs made in the form of a bar of wrought iron, in
" which the space to receive the rail forms a groove throughout
" its length. This bar is cut transversely at suitable distances
" apart to form a number of chairs (the cut parts forming the
" sides of the chairs). These chairs are somewhat of the ordinary
" form of cast iron chairs but lighter."

[Printed, 10*d*. Drawing.]

A.D. 1857, February 21.—N° 512.

MIDDLETON, John, and STENT, William.—"Improvements in railway chairs, and in the jointing of rails for railways."

"The chairs are made in parts of a peculiar shape or formation, so that one part or loose cheek is made to slide into the other part in an angular groove, cast in a slanting direction across the bed plate of the chair, of which the fast cheek forms a part. The loose part or cheek sliding in the angular groove has a wedge-like action, and becomes tightened when driven across the bed plate, and is thus secured in its place without a possibility of becoming loose by means of an excentric wedge or spike driven into the sleeper, thus forming a solid and compact chair, which gives an equal bearing or pressure to the rail. Another modification of the same consists in placing it in a line with the bed plate instead of across it."

"The rails are jointed where they come in contact by inserting a double wedge, part of it into one rail and part into the other, to keep them in contact and prevent their rising or separating."

[Printed, 1*s*. Drawings.]

A.D. 1857, February 24.—N° 538.

HAWKS, Stephen Wright.—(*Provisional protection only.*)—"Improvements in railway chairs."

"In forming the chair in two separate side pieces, rolled, forged, or cast to whatever section the shape of the rail may require, one piece fitting on each side of the rail, and a bolt or bolts being passed through suitable holes in the rail and the two side pieces respectively, so as to connect the three thicknesses of metal firmly together. These side pieces are also formed with a foot or lateral extension, so as to rest on a bottom plate, to which they are firmly secured by a bolt or bolts. The bottom plate is rolled with clips or jams on the outer edge to confine the chair laterally. The bottom of the rail may rest on the central part of the bottom plate."

"At the junction of two ends of rails the length of the chair is increased."

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 26.—N° 564.

HOY, Joseph.—(*Provisional protection only*).—" Improvements " in apparatus for distributing sand on railway rails."

" In arrangements of levers and valves connected with suitable " sand boxes attached to the locomotives or other vehicles of " railway trains, for distributing sand with greater precision than " can be at present attained."

"The sand box acts as a hopper to contain the sand, and is " supplied at bottom with a pipe, above which, under the box, is " a horizontal slide worked by a wire or rod connected with levers."

"The slide or valve covers oblong, round, or other shaped apertures, and is made self-acting by a spring regulated by a " notched handle, or similar means, for graduating the delivery " of the sand for distribution through the pipe on to the rail."

[Printed, 4*d*. No Drawing.]

A.D. 1857, February 28.—N° 592.

TYLER, Henry Whatley.—" Improvements in the permanent way of railways."

"A method of securing bolts and nuts by which the ends of " railway rails are bolted to fishing plates, when fishing plates " are employed; and also for fixing railway rails to their chairs " or supports so as to prevent such bolts and nuts from turning, " and so becoming loose. For this purpose bolts and nuts are " used in which the heads are made smaller on the insides or " parts which come against the fishing plates than on the outsides; " and in conjunction with bolts and nuts so made a plate having " notches cut in it to fit the smaller parts of the heads of the " bolts, or of the nuts, is used, and when the bolts and nuts are " screwed up this plate is driven down over such smaller parts of " the heads of the bolts or nuts, and the bolts and nuts are thus " secured from turning until the plate is removed."

[Expired 3rd year. Printed, 10*d*. Drawings.]

A.D. 1857, March 3.—N° 625.

NEWTON, William Edward.—(*Provisional protection only.*)— (*A communication.*)—" Improved machinery for removing snow " from railways."

" This invention consists in an improvement on a snow plough

" for which letters patent were granted to him, May 13th, 1856, " and has for its object the adjustment of the central vertical " planes (described in that patent), so that the snow on the track, " after being raised up to the level of the surrounding snow, can " be all pressed or thrown over laterally on to either side, as may " be desired."

[Printed, 4*d*. No Drawings.]

A.D. 1857, March 5.—N° 645.

GREAVES, Hugh.—"Improvements in the mode of coupling " or connecting pipes, columns, and conduits, in the machinery " for manufacturing the hoops to be used in connecting such " pipes and columns, and in the shape of such pipes, columns, " and conduits, whereby they become adapted for the support " and conveyance of vehicles."

"An improved method of joining pipes for the conveyance of " gas, water, or other fluids, or for any of the many purposes for " which pipes are usually employed; by which arrangement the " joints of such pipes or conduits are more efficiently and more " economically made. Also to the employment of such pipes " when combined with a cast-iron rail or tramway, either cast " with the pipes or fixed thereto, or with a wrought-iron rail " attached thereto, for the double purpose of conveying fluid or " other bodies, and as bearing surfaces for vehicles; likewise to " the joining of solid or hollow columns, and to the method of " manufacturing the conical collars or hoops used for connecting " the ends of such pipes, conduits, or columns."

[Printed, 8*d*. Drawing.]

A.D. 1857, March 9.—N° 677.

HEMMING, Frederick Shand.—"Improvements in the " manufacture of railway chairs and sleepers."

It is proposed to manufacture railway chairs and sleepers of substances not hitherto so made use of, consisting of any suitable kind of animal or vegetable fibrous materials, such as spent tan, spent hops, rags, paper, wood, hair, rope, and such like matters.

These substances are reduced to a dough or thick pulp, and may be mixed with oil, tar, and other such products to render them more cohesive; they are then put into moulds of the required shape, and subjected to hydraulic or other similar pressure.

[Printed, 4*d*. No Drawing.]

A.D. 1857, March 9.—N° 692.

BARLOW, William Henry, and SAMUEL, James.—"Improvements in cast-iron sleepers for railways."

"The sleepers are intended to be used longitudinally of the "permanent way of a railway, and are cast of a rectangular "form. The upper surface has thereon a central longitudinal "trough, divided at intervals transversely by partitions for "receiving wood or other soft material. On either side of the "walls constituting the trough there are at intervals inclined "buttresses, which are cast hollow on their under sides. By "reason of the trough on the upper surface provision may be "made for receiving and fixing various forms of rails securely."

"At intervals these sleepers have transverse projecting ribs "both on the under as well as on the upper surface. The rails "are fixed to these sleepers by means of peculiar chairs, which "are cast or formed at the under sides to correspond with the "upper surface of the sleepers. Each chair is formed to receive "two moveable jaws, consisting of hollow frames of iron, arranged "suitably for receiving a filling of wood shaped to fit the side of "the rail where the wood comes in contact with the rail."

[Printed, 10*d*. Drawing.]

A.D. 1857, March 10.—N° 701.

BAYLIS, Charles.—"An improved method of constructing "and arranging roads and ways, particularly applicable to "populous cities and crowded thoroughfares."

"A rail or tramway is combined with roads or ways for ordinary "carriages and foot passengers in such a manner that the traffic "on both can be carried on independently and without interfering with each other. Provision is also to be made for the "sewers, and also for the gas and water pipes and telegraph wires, "by excavating the ground to a suitable depth, and building "three tunnels side by side and parallel to each other. In the "centre one is constructed the main sewer for the thoroughfare, "and in the two side tunnels it is proposed to place the gas and

" water pipes and the telegraph wires. In order to gain access to " these tunnels apertures covered with moveable metal or other " plates or covers are made on the top of the tunnels, and " strong sheets or blocks of glass may be let into the top of the " tunnels at intervals, so as to admit light to the interior."

" On the top of these tunnels it is proposed to construct two, " three, or more lines of railway for the use of locomotive engines " and carriages; and immediately above the railways on the side " tunnels, and at about the level of the present roads, build the " road or way for the ordinary traffic; but instead of covering " over the subterraneous railway the whole width of the street, " it is proposed to leave an open space about six feet wide all " down the centre of the thoroughfare. This will admit light " and air to the railway beneath. In some cases, especially when " the thoroughfare is restricted in width, it is proposed to con" struct footways above the present footways, so that the whole " width of the latter may be thrown into the carriageway and " devoted to carriage traffic."

[Printed, 6*d*. Drawing.]

A.D. 1857, March 18.—N° 765.

ANDERSON, Sir James Caleb.—(*Provisional protection only.*)—" Improvements in locomotive and other carriages."

"First, in fixing horizontally and longitudinally a cylinder on " the top of a tubular locomotive boiler. The cylinder is to be " united to the boiler by vertical pipes, and used as a steam " chamber. By this arrangement the tube cylinder and fire box of " a locomotive boiler can be kept almost full of water, which will " secure the tubes and the top of the fire box from being left " uncovered with water on ascending or descending hills."

"Second, an universal railway, constructed as follows: The " wheels of locomotive engines for common roads, or for plough" ing, carriages," and other vehicles "are to be placed within " other wheels of larger diameter, so arranged that each wheel " will run on the concave surface of a larger wheel, which is to " form its railroad. The spokes of the large or railroad wheels " are to be fixed to the rims of the wheels as close as they can be " to the outside, leaving a sufficient breadth of rim from outside, " inwards to form the railroad on which the wheels can run. The " axle of each large wheel or circular railroad is to revolve in a

“ box fixed to a frame placed on the outside of each large “ wheel.”

“To get rid of the opaque appearance of the exit steam of loco- “ motive engines for common roads,” it is made “to pass through “ coiled pipes (one for each cylinder), which are to be as long as “ possible, and fixed to the cylinders in the smoke box to which “ a fan is to be attached, having suction pipes so placed as to “ draw the heated air proceeding from the fire box of the boiler “ around the outside services of the coiled pipes containing the “ exit steam. The exit steam of the pan is to be placed with its “ mouth upwards in the chimney; thus the heated air would be “ brought into contact with the coiled pipes containing the exit “ steam by being drawn into the fan, from which it will be forced “ up the chimney mixed with the heated exit steam and act as a “ noiseless blast, and thereby secure a good draught. Should the “ heated air drawn from the fire not be intense enough to render “ the exit steam transparent, a small supplementary fire is used “ to augment the heat, which may also be increased by a second “ fan to blow into the ash box of the fire.

[Printed, 4*d*. No Drawings.]

A.D. 1857, March 21.—N° 790.

SEATON, WILLIAM.—“Improvements in the construction of “ the permanent way of railways, and in the machinery or appa- “ ratus employed therein.”

“It is proposed to use longitudinal sleepers of rough baulks of “ timber, of a rectangular, semicircular, or other convenient sec- “ tion. The baulks of timber, after being sawn, are dressed or “ faced on their upper surface, so as to receive the flanges of the rail “ to be adapted thereto, the shaping being effected by means of “ rotatory cutters of any suitable shape required. Also to con- “ struct a roadway of longitudinal cast-iron sleepers, of a rect- “ angular or semi-rounded section, to suit the bearing or flanges “ of the rail, a layer of suitable material being interposed between “ the bearing of the rail and the sleeper for the purpose of “ lessening the noise or sound produced by the transit of the “ trains, and also for causing less vibratory motion and increas- “ ing the smoothness and durability of the road.”

“ One improved form of rails consists in making the flange of “ the rail of a perfectly rectangular form.”

"Another form consists of the ordinary bridge rail or common
" girder rail, constructed with rounded or concave flanges to suit
" the rounded or flattened form of the timber sleeper."

[Expired 3rd year. Printed, 1*s.* 4*d.* Drawings.]

A.D. 1857, March 21.—N° 803.

HEMMING, Frederick Shaud.—(*Provisional protection only.*)
—"Improvements in the mode of treating peat, mixed or not
" mixed with other vegetable or animal fibrous substances, and in
" the application of the same to various purposes."

"The peat is prepared by triturating it well, and when neces-
" sary the earth matters are removed. It is then mixed with a
" quantity of other fibrous materials so as to increase its fibrous
" texture, then with a combination of oil, resin, tar, india-rubber,
" and gutta percha, one, all, or any of them in various propor-
" tions, resembling in some degree the constitution and possessing
" the properties of 'marine glue.' The effect of it is to produce a
" viscous tough mass, which, being put into moulds prepared
" according to the form of the article to be made, is subjected to
" hydraulic or other pressure, and allowed gradually to cool. It
" is proposed to render it also non-inflammable by impregnating
" it with any of the metallic salts known to possess that property.

"Also to make use of the peat, prepared in this way for
" manufacturing railway chairs and sleepers, and other similar
" articles."

[Printed, 4*d.* No Drawings.]

A.D. 1857, March 21.—N° 805.

HEAD, Thomas Howard, and WRIGHT, Joseph.—"Im-
" provements in casting railway chairs, and in the manufacture of
" other castings."

"The object is effected by means of a moveable webb, working
" on rollers at each end, and consisting of small bars of iron fixed
" on a chain at a few inches apart, the ends of these pieces work-
" ing in a guide cast on the table at which the men work. On
" the ramming-up plate is cast or fitted a small pin, which, when
" the ramming-up plate is upon the table, catches in the move-
" able webb and draws it to where it is required. When it is
" required to be stopped, a small lever is risen above the level of

" the table, worked by an eccentric shaft and forming an inclined " plane, up which the webb pulls the plate till the pin clears the " webb (which is always moving), and by lowering the handles " the pin is again connected with the webb, and moves with the " box and the patterns to the next operator. There are two " trunnions cast upon the box, which passes between the wheels, " the ramming-up board being fastened to it by means of hasps. " On these wheels are two pockets, which take hold of the trun- " nions on the boxes, lifting the box and bottom board together; " and on arriving at the greatest height the box is tipped by " means of a piece projecting from the standards, and lowered " again by the wheels on to the table, where it is again connected " by the means before described on to the moveable webb."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1857, March 26.—Nº 852.

MORRIS, JAMES.—" Certain improvements in connecting the " rails of railways."

" In providing in the sides or channels at each end of each " 'rail' or length of rail in a line of rails a hole or orifice, into " which a piece of iron or other suitable metal is driven or in- " serted, which then projects on each side of the rail and has the " ends thereof slotted. And when two lengths, each constructed " as aforesaid, are brought end to end together to form a line of " rails, two screw bolts or bars are placed one on each side of the " rail in the recesses or slots (or in the substituted orifices of the " two projecting pieces, one on each end of each rail or length of " rail, that is, longitudinally on each side of the rail in the channels " thereof, such screw bolts or bars having each an enlarged part " in the middle, and a right-handed thread at one end and a left- " handed thread at the other, on which corresponding screw nuts " are placed; and secured by screw nuts."

" For better securing the ends of each rail or length of a line of " rails it may have a curvated or other suitably shaped notch or " cut made therein, which when two ends are brought together " form one complete orifice, into which a corresponding pin is to " be inserted to secure the ends of the rails from moving up and " down."

[Printed, 8*d*. Drawing.]

A.D. 1857, March 28.—N° 868.

RUSSEL, Robert.—(*Provisional protection only.*)—" Improve-
" ments in railway turntables."

" Each turntable is constructed of four iron beams in the fol-
" lowing manner:—Two beams, called the lower beams, are each
" made with two recesses or cranks in them, in which are placed
" the two upper beams, so that the upper surfaces of the four
" beams are all in the same horizontal plane, the upper being at
" right angles to the lower. The rails are fixed on the upper
" surfaces of the four beams on suitable bearers, and the upper
" surface of the table is plated or planked over in any convenient
" manner. Each turntable is supported by four wheels, there
" being a suitable circular rail for the wheels to run on under the
" table. The table may be connected with and turn on a central
" post in any convenient manner, but it is preferred to suspend a
" casting by suspension rods from a cap on the top of the post,
" and that such casting should receive and bear the four cranked
" parts of the under beams; or in place of the casting, four
" wrought-iron bearing plates may be used under such four bent
" parts of the beams, the bearing plates being suspended by four
" suspending rods from the cap on the post, the bearing plates
" being also connected near to the outer ends of the four beams
" by means of eight tie rods."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 2.—N° 917.

MAW, Edwin.—" An improvement in the construction of the
" points of railway crossings."

" Applying what are called fish plates in combination with a
" steel point where the two rails of a railway crossing come to-
" gether. For this purpose the point made up of steel comes up
" to or butts against the ends of the two rails where the come
" together, and the steel point and the ends of the two rails are
" fixed together by means of two fish plates, one on either side,
" screw bolts being passed through the fish plates and through
" the steel point, and also through the fish plates and the two
" ends of the rails, by which means and by screw nuts the whole
" are bolted securely together."

[Printed, 6*d*. Drawing.]

A.D. 1857, April 4.—N° 943.

LECLERCQ, Adolphe.—(*Provisional protection only.*)—" Certain improvements in sleepers of railways."

The patentee says, " it consists in forming metal sleepers and " chairs all in one piece. Metal sleepers have already been sub- " stituted for wood, but the sleepers and chairs " have not been " formed in one piece of metal. The inside cheeks of the chairs " must be formed to suit the shape of the rail they are to " support."

[Printed, 4*d.* No Drawings.]

A.D. 1857, April 9.—N° 1011.

BEECH, John, and WILLIAMS, John.—" An improved mode " of securing the rails of railways in their chairs."

" An improved mode of retaining the keys or wedges of railways " in their place, and thus ensuring stability in the railways, and " applies more particularly to the keying of the crossing rails in " their chairs."

" In carrying out the invention " it is preferred " to use cast- " iron wedges with a hole through them to admit of the insertion of a screw bolt. This bolt extends from the wedge of one chair " to the wedge of the next chair, and by the application of a lock " nut to the end of the bolt the two wedges will be drawn " together and caused to hold the rail firmly in place; or it may " be made to act on the wedges in the opposite way, and thrust " them apart."

[Printed, 6*d.* Drawings.]

A.D. 1857, April 11.—N° 1022.

ROBINSON, John Blythe. — (*A communication.*) — *Letters patent void for want of final specification.*)—" Improvements in " machinery or apparatus for effecting agricultural operations."

" In affixing digging knives or cutters of peculiar forms to a " digging cylinder. To the back part of the machine suitable " instruments are attached for forming drills or furrows, and for " harrowing. For the purpose of heating the feed water with a " portion of the exhaust steam, a tank will be attached to the " under side of the smoke box, and an apparatus is placed in the

" smoke box for superheating the steam. Also in the application " of endless rails, or detached part of rails, to the wheels of the " machine. For obtaining a greater bite or friction on the ground " for the purposes of locomotion I apply skids or shoes to the " main supporting wheels."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 13.—N° 1036.

RICHARDSON, Thomas, and BROWELL, Edmund John Jasper.—" Improvements in treating old or waste railway wood " sleepers and bearers, and in preparing or preserving wood for " railway sleepers and bearers, and other works."

The patentee says, " wood is employed for sleepers and bearers " of the rails, prepared by tar, or products obtained by distillation " from tar. Part of the invention consists in subjecting the old " or waste sleepers and bearers to the process of dry distillation, " to obtain tar therefrom suitable for preparing wood for sleepers " and bearers and other works; and in combining with tar used " for preparing or preserving wood for railway sleepers and bearers, " and other works, a chemical solvent, such as caustic soda " solution."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 13.—N° 1047.

RAMSBOTTOM, John.—" Improvements in wrought-iron railway chairs, and in machinery for manufacturing the same and " other articles."

In constructing railway chairs with two open jaws, between which the rail is supported; these jaws are somewhat wider about than below, and the spaces between the jaws and the rail are filled up by packing pieces; when the load comes upon the rail the packing pieces are wedged tightly between the jaws of the chair, thereby more securely holding the rail, owing to the elasticity of the chair. The wrought iron for making the chairs is rolled of the required section, and cut off to the proper length by means of the improved machinery.

[Printed, 1*s*. Drawings.]

A.D. 1857, April 22.—N° 1134.

TAYLOR, Robert, WORSWICK, Richard, and LOVATT, John.—"Improvements in railway chairs and in the mode of "securing the ends of rails therein."

"According to one arrangement, a peculiar form of joint chair "is used suitable either for the ordinary double or single T "headed rail. This chair has a transverse opening made "through each jaw, and is fitted or formed with an internal projecting lip or shoulder, which serves to hold the ends of the rails "steady in their position by bearing against the web or sides "thereof. The rail ends are slotted or notched transversely to "correspond to the transverse opening through the chair, and "slightly wedge-shaped key or cottar is driven transversely "through the chair and through the slots or notches in the rail "ends, by which means they are held firmly down on to the bed "or rail-bearing surface of the chair. The expansion of the rail "is allowed for by making the slots rather wider than the key or "cottar which passes through them."

"The second relates to suspended joints, such as are generally "made when 'fish plates' are used. For this purpose it is proposed to use a clutch of cast iron, made to clip the lower edge "or flange of the rail ends, whilst one of the jaws of the clutch "is made to reach up and bear against one side of the web. A "transverse opening is made through this clutch in such a position "that when the rail ends are inserted, and a cottar or cottars "driven through it, the under sides of the rail ends will bear upon "such cottar or cottars, and will be forced up firmly into the jaws "of the clutch by driving the cottars home. The joint is complated by passing a cottar or cottars or one or more bolts or "screws through the jaws of the clutch and through the web of "the rail ends."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1857, April 25.—N° 1169.

WHITE, William.—(*Provisional protection only.*)—"Improve"ments in making moulds or matrices employed in casting "metals."

"Particu'arly railway chairs and wheels, window weights and "*shot.*"

"By ramming the sand or other material employed round the "pattern by the aid of a press, in place of effecting the same by "hand. The mould boxes are brought underneath the press and "are rammed or packed by a descending plate or ram. Two of "these plates may be used, the one rising as the other descends, "and the boxes are carried in and out of the press by means of "self-acting travelling tables."

"In some cases the under portion of the mould may be formed "by having the lower half of the pattern fixed to the pressing "plate and pressing it into the mould box filled with sand or "loam by the action of the press, whilst the upper half of the "mould is being made in a separate box by the second plate "of the press."

"The pouring hole or in-gate is made by a suitable projecting "pin on the pressing plate, which penetrates the mould on the "descent of the plate."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 11.—N° 1329.

BROOMAN, Richard Archibald.—(*A communication.*)—(*Provisional protection only.*)—"An improved locomotive appa-"ratus for rail and ordinary roads."

"This consists of a carriage carrying its own endless railway in "the shape of two large wheels, one on each side of the car-"riage, formed with a groove on the inside, and a cross the "groove there are fitted at regular distances projections or bars, "so as to form an endless circular rack. The carriage is "supported at bottom upon two rollers or wheels, which travel "each in the groove in the endless railway. Two other rollers "maintain the carriage in position at top."

It is propelled by a "wheel on each side fitted with teeth which "take into the rack. These are placed behind the supporting "rollers, and are caused to rotate by a shaft driven by a steam "engine or other prime mover. The shaft is fitted with disen-"gaging apparatus, and carries three sets of gear wheels, whereby "the speed at which the toothed wheels are driven can be modi-"fied. By means of a screw arrangement the weight of the "carriage may be thrown forward or backward upon the rails "to suit any rise or fall in the road."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 12.—N° 1336.

BARLOW, WILLIAM HENRY, and MILLS, WILLIAM HEMINGWAY.—(*Provisional protection only.*)—" Improvements in " the permanent ways of railways."

" For these purposes cast-iron bearing plates are used, divided " longitudinally, and hinged together in such manner that the " jaws or projections, which receive the rails between them, may " be allowed to move or open out a short distance from each " other to admit of wood keys, wedges, or filling pieces being " introduced between the jaws or holding projections and the " sides of the rails held between them, whereby, when the wood " keys, wedges, or filling pieces shrink or become loose, the pres- " sure of the passing trains will, by reason of the hinging of the " bearing plates, cause the upper parts of the opposite jaws or " holding projections to come towards each other and clip the " rails and filling pieces tightly between them."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 12.—N° 1339.

BROOMAN, RICHARD ARCHIBALD.—(*A communication.*)— " Improvements in the preparation of steel, and in the steeling " or manufacture of tyres, shafts, axles, and other forgings."

" In forming them partly of iron and partly of steel, by intro- " ducing such steel into them at those parts most subjected to " friction and wear. Three layers of good iron are taken, and " on the top a band of the prepared steel is laid, and on the sides " other blocks of iron are placed. Over the top is placed a thin " layer of iron, which is not absolutely essential, but it is found " to be advantageous, to protect the steel from the injurious " action of the air during the welding. The whole mass is now " welded, then hammered and rolled, or made otherwise into the " form of an ordinary tyre."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1857, May 13.—N° 1349.

GIBBON, ABRAHAM FITZ.—(*Provisional protection only.*)— " Improvements in the form of rails for use in railways and tram- " ways."

"For these purposes, in place of rolling or forming the lower or "bearing flanges of rails for railways or tramways with parallel "sides, and making holes through such parallel flanges, the lower "or bearing flanges of the rails are formed with projecting lugs "at intervals, through which the necessary holes are made for "receiving the screws, bolts, or other fastenings for holding down "such rails."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 22.—N° 1445.

PARSONS, PERCEVAL MOSES.—(*Provisional protection only.*) —"Improvements in making moulds for casting railway chairs "and other articles in metal, and in apparatus for that purpose."

"In so constructing, arranging, and applying the moulding "boxes, patterns, and apparatus in connection with them that "the mould formed by running the sand or other moulding ma"terial into the box is separated or delivered from the pattern by "turning the moulding box containing it around a centre or axis "connected with or fixed in a suitable relative position in respect "to the pattern, or by turning the pattern round a centre or axis "fixed to or in a suitable relative position in respect to the "moulding box; also that the moulding box may be inverted by "turning it round the aforesaid centre or axis as far as required."

"In moulding railway chairs, moveable pieces or chills are em"ployed when necessary, and so arranged that they will be sepa"rated from the pattern by the circular movement of it; or the "box or the projecting parts of the patterns are formed by sliding "or moveable pieces, that are withdrawn previous to the box or "pattern being turned around the aforesaid centre or axis."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 25.—N° 1467.

FORD, HENRY WILLIAM.—(*Provisional protection only.*)— "Improvements in apparatus for facilitating the draft and loco"motion of carriages."

"This invention consists in the use or employment of rings or "hoop railways, within and upon the lower part of which the "carriage wheels run or roll. These rings or hoop railways are "of greater diameter than the wheels, so as to encircle them with"out contact, excepting at the lower part of the circumference, "where they constantly present a bearing surface between the "wheels and the road or ground."

"As the carriage wheels turn round, their weight causes the "rings or hoop railways to turn or roll upon the ground, and "suitable guide groves or bars fixed on them to enable the wheels "to keep them in their course or direction of running. Check "guides fixed on the carriage also assist in keeping them in their "course."

[Printed, 4*d.* No Drawings.]

A.D. 1857, May 25.—N° 1472.

TYLER, Henry Whatley.—"Improvements in the permanent "way of railways."

"An improved method of securing rails to their chairs, sleepers, "or supports; and securing the ends by means of fishing plates; "and of securing railway chairs to their sleepers or supports. For "these purposes bolts are employed, having plain stems and "heads at each end, and are made of a length to suit the thickness of the pieces which they are to secure, and in each of "these pieces a long and narrow hole is made, corresponding in "form to the oblong head of the bolt, and the pieces are firmly "held together by clips, while the bolts are put in and turned "one quarter round. The bolts are afterwards secured by sliding "or placing over their heads locking plates, which prevent them "from turning, for which method of securing the bolts a patent "has been granted to him; or they are secured from turning by "driving keys by the side of the bolts into the holes in the parts "connected by the bolts."

[Expired 3rd year. Printed, 1*s.* 6*d.* Drawings.]

A.D. 1857, May 25.—N° 1477.

AUBERT, Louis Désiré.—"Improvements in fastenings for "securing rails in the chairs."

"First, in uniting the rails end to end by means of pins, "which project beyond the end of the one rail, and are received "into corresponding holes in the abutting rail. Instead of two "or more such pins being used, a deep flat projecting piece "may be formed on the one rail, and a corresponding recess "*formed in the other.*"

" In joining or disconnecting these rails they are slid when loose " in their chairs in the direction of their length." And in the use " of a fish plate fitted between the wedge and the side of the " rail at the joint, which fish plate is furnished with projecting " parts on the inside, which are received into holes formed in the " rib of the rail, and held firmly therein by the wedge when it is " driven tight in the chair. The plate is curved to the form of " the rail, and in the hollow side receives the wedge and prevents " it from rising out of the chair."

[Printed, 8*d*. Drawing.]

A.D. 1857, May 28.—N° 1514.

COX, NATHANIEL.—(*A communication.*)—" Improvements in " railways."

" Two side rails or trams are laid down, on or in which the " wheels of the carriages run. A central corrugated rail is laid " between the other two rails. The driving wheel or wheels of " the engine run upon this central rail. This central rail may " extend the whole length of the railway, or only on steep " inclines."

" In lieu of a single central corrugated rail, two may be employed, either between the two side rails or outside them."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1857, May 30.—N° 1531.

RIDLEY, RALPH ERRINGTON.—(*Provisional protection only.*)— " Improvements in the permanent way of railways."

" Certain methods of constructing and combining the sleepers, " chairs, and rails of railways, by means of which elastic " materials may be easily and efficiently combined therewith."

" According to one modification a longitudinal metallic sleeper " is formed, having upon its upper side vertical ribs, which " include a space or chamber of any desirable depth; and in " combination with this sleeper a rail is used, having formed upon " its lower side vertical ribs, which, when the rail is in place, " clasp the ribs of the sleeper. In the space or chamber between " the ribs is placed a block of vulcanized india-rubber, upon " the upper surface of which the rail rests, and which will yield " slightly to the downward pressure of an engine or carriage

" running upon the rail, the ribs or sides of the chamber at " the same time prevent the india-rubber yielding too much " laterally."

[Printed, 6*d*. Drawing.]

A.D. 1857, June 3.—N° 1564.

REMINGTON, George, and BALCOMBE, John Barton.—(*Provisional protection only.*)—" Improvements in locomotive " engines applicable to common roads."

" The application to locomotive engines of endless chains, the " links of which as they are laid upon the ground will form a " way for the running wheels to pass over. The chains extend " from the fore to the hind wheels, and they are secured thereto " by flanges on the wheels or otherwise. The motive power of " the engine is communicated to the wheels by cranks, and the " rotation of the wheels will carry round the links, cause them to " form an unbroken line of rail on the ground for the support of " the moving engine."

[Printed, 4*d*. No Drawings.]

A.D. 1857, June 5.—N° 1588.

MORRIS, James.—" Certain improvements in connecting the " rails of railways, and in supporting the same."

" In having at each side of the rail, near the junctions, cheek " pieces placed in the channels of the rails, and secured together " by pins or bolts passing through such plates, and also through " the rails, and also having one of these cheek pieces slotted " near the centre to receive a corresponding screw bolt, which " has an enlarged blank part passing through a slot formed between the joint of the rail; by bringing together two grooves " or cuts made in each of the ends of the lengths of rail, the " screw end of the said screw bolt passing out at an orifice provided in the other cheek piece, and being there secured by a " screw nut, makes a firm junction of the lengths of rail, securing " the same from shifting vertically or horizontally."

" For supporting the rail a chair is used, the peculiarity of " which is that the inner projections of the chair are made " angular, so as to grip or cut into the bottom flange of the rail, " and fastened by a corresponding key or wedge."

[*Expired* 3rd *year*. Printed, 1*s*. Drawings.]

A.D. 1857, June 11.—N° 1641.

CLARK, Josiah Latimer.—"Improvements in apparatus for "conveying letters or parcels between places by the pressure of air and vacuum."

"Improvements in telegraphs, in which letters or other articles "are conveyed through pipes by pneumatic pressure. In making "the joints in the line of pipes in such a way as not to interfere "with the passage of the package, by causing the ends of the "pipes to butt together, and slipping a ring or short piece of tube "of vulcanized india-rubber or of any other air-tight material "over the joint, and the ends of the metal pipes are held accurately in their positions by a socket made in two halves, "connected together with screws, which socket covers the vulcanized india-rubber ring, and clips firmly the ends of the "pipes."

[Printed, 1*s*. Drawings.]

A.D. 1857, June 15.—N° 1667.

HEATON, Thomas.—"Improvements in self-acting doors and "gateways."

The patentee says, "This invention consists of improvements "upon an invention for which I obtained letters patent, March "24th, 1856."

"My present improvements consist of fixing horizontal levers at "each side of the passage or doorway turning on pivots; I curve "the said levers so that each of them nearly meet at their extreme "points, and pass through holes or apertures in the doors or "gates, in which I fix friction pulleys to allow the ends of the "said levers to pass easily through them. The doors or gates "slide on cross bars or rails, so that when a horse or anything "comes in contact with the curved shafts, pressing laterally "against them, the pressure pushes the doors or gates sideways "into recess prepared for them, which will remain there as long "as there is anything pressing against them; but the moment "they are freed from the lateral pressure they will close of themselves, either by means of a simple pulley and weight to draw "them back to their closed position, or by giving the horizontal "or cross bars or rails on which they slide a slight incline from "the centre."

"These self-acting doors or gates are applicable to mines, the "private railways of collieries, hoists, public works, parks, and "other similar purposes."

[Expired 3rd year. Printed, 1*s.* 6*d.* Drawings.]

A.D. 1857, June 16.—N° 1684.

FOWLER, John, junr., CLARKE, Thomas, and BURTON, Robert.—"Improvements in the construction and arrangement "of locomotive and other carriages, to facilitate their movement "on common roads to other surfaces."

"First, in a method of arranging locomotive carriages so that "the wheels on both sides of the carriage may be driven without "in any way interfering with the steerage of the carriage." And in "facilitating locomotive carriages in the ascent of hills "by applying the power to the wheels. For this purpose a small "winding drum is mounted on the carriage, and when a difficult "place is to be got over a rope is taken out and made fast ahead, "and by throwing the drum into gear the carriage is caused to "wind itself forward, or if the locomotive carriage is used for "hauling other carriages, the locomotive may ascend the hill or "pass the difficult place without its load, and having made itself "fast may wind its load forward by the drum."

"Another part applies to locomotive carriages which lay for "themselves a road on which to run, and consists in increasing "the bite of the wheels on the road which they lay by making "the wheels of V form at their peripheries, so as to run in similar "grooves in the sections forming the road; and the parts of each "section on one and other side of the V groove are connected "together on the under side by steel plates, which spring slightly "when the weight comes on the section, so that the wheel is "tightly nipped by the two sides of the section of road."

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1857, June 19.—N° 1714.

HILL, Joseph.—(*Provisional protection only.*)—"Improvements "in the permanent way of railways."

"Firstly, to produce a form of rail to be fixed without chairs, "the head or working surface of which can be replaced or renewed "when worn out at a much less cost and trouble than the ordinary

“ rail; and, secondly, a new form of rail, which does not require
“ any wooden sleepers at all.”

[Printed, 6*d*. Drawing.]

A.D. 1857, June 19.—N° 1719.

NEWTON, William Edward.—(*A communication.*)—“ Improvements
“ in the construction of railway crossings.”

“ A method of combining a flexible rail, which is fixed at one
“ end with a fixed rail and point, supporting chairs of a peculiar
“ form being employed. The elasticity of the moveable rail is
“ made to keep it in its place, and still permit of its yielding
“ sufficiently to allow the flange of the wheel to pass.”

“ Also in placing a stop opposite to the point of the crossing,
“ for the purpose of supporting the rail at that point. The point
“ of the moveable rail is also secured from rising out of place by
“ means of a hook and rebated chair.”

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1857, June 24.—N° 1762.

VASSEROT, Charles Frédéric.—(*A communication from Jean-Claude Durand.*)—(*Letters patent void for want of final specification.*)—“ Improvements in the permanent way of railways.”

“ A chair intended for single-headed rails is composed of a bed
“ which is sunk into and rests upon the sleeper, and on which the
“ base of the rail is supported. From this rises up the two sides
“ forming the channel for resisting the lateral thrust of the rail,
“ and which extending horizontally increases the bearing surface
“ of the chair on the sleeper. At about half way from the top to
“ the base of the sides or supports a semicircular groove is made
“ on each side, corresponding exactly with the semicircular grooves
“ of the rails.”

“ The chairs made for double-headed rails are of a similar construction,
“ with this difference only, that the sides or supports
“ have two semicircular grooves made in each, instead of one.
“ The base of the chair is sunk in all its thickness into the sleeper,
“ and by means of two or three treenails or spikes placed at both
“ ends and in the centre of the channel, is fixed to the sleeper.”

“ The rails, both single and double-headed, may have their extremities
“ joint one into the other by means of cuts made at

" right angles, either vertically and laterally, or in the direction of " the height and width, and in the shape and form of what is " called a rabbit or zig-zag joint."

[Printed, 4*d*. No Drawings.]

A.D. 1857, June 24.—N° 1768.

SANDERSON, CHARLES.—" Improvements in the manufacture " of railway bars, girders, and other articles requiring great " strength and stiffness to resist pressure, concussion, or strain."

" Certain improved methods of making these articles of a combination of iron and steel, or of steel only, and afterwards " hardening and tempering the articles for the purpose of increasing their strength."

" In carrying out the invention it is proposed to make either " solid or hollow bars, and one plan of effecting this object consists in 'converting' a thick bar of iron, and then rolling it into " the desired form, and subsequently hardening and tempering it. " By this means a very strong and durable rail will be produced, " having a hard steely surface, capable of resisting wear to a " greater extent than a common rolled iron rail, and internally the " rail will be composed of tough iron, as the 'conversion' would " not reach the centre of the bar."

" Another mode consists in taking a bloom of iron heated to a " white heat, and adding thereto cast steel in a fluid state. These " blooms of combined metal are then rolled out into a bar of the " required form and dimensions."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1857, July 1.—N° 1831.

NICKLESS, JOSEPH.—" A new or improved railway chair." The said chair is made of cast iron, and consists of two parts, one fixed and the other moveable. The moveable part rests upon the bed plate of the fixed part, and between the cheeks of the parts the rail is held. The moveable part is made to bear firmly against the rail and hold it in the following manner:—A wrought-iron wedge or cotter is driven between the moveable part and the two uprights or side wings on the bed plate of the part, the motion of the said cotter or wedge being in a horizontal plane. By the action of the said wedge or cotter the moveable part of the chair is made to bear firmly against the rail and hold the said rail securely in its place. The said wedge or cotter may be fixed either by a key fastened transversely through its end, or by a nut on its screwed end; or the said end of the wedge or cotter may be split, and then clenched after it has been put in its place.

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1857, July 3.—N° 1863.

ROYDS, THOMAS, ROSCOW, THOMAS, and LORD, JAMES.—“ Improvements in lifting heavy bodies under certain circum-“ stances, such as minerals or other substances from mines to the “ surface of the earth, or from one storey of an edifice to another, “ and in machinery or apparatus to be used for such purposes.”

The said invention is applicable to the raising of railway waggons from one platform to another, and other operations of a similar character. By attaching the matter to be moved to a moveable nutt cylinder or barrel formed with an internal screw, corresponding to an external screw or thread upon a vertical shaft which passes through the screwed nutt, cylinder, or barrel. The screwed shaft being put in motion round its axis, while the nutt or cylinder is prevented from turning, the latter, together with its load, is compelled to move along the line of the shaft.

[Expired 3rd year. Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, July 7.—N° 1878.

BADGE, RICHARD JOHN.—“ Improvements in railway chairs.”

“The chair is made with elongated arms, and fixed upon a “ sleeper immediately under the joint or weakest part of the rail, “ the arms extending some distance each way from the joint or “ connection of the two rails, but having their bearing on the “ centre or strongest part of the chair, thereby giving a proper “ and equal distribution of the metal, and also affording a proper “ distribution of the other sleepers at regular distances, and “ thus further prevent deflection of the rails or breakage of the “ chairs.”

“And in driving in wedges to prevent the bolts or nuts from “ turning and becoming loose.”

[Printed, 8*d*. Drawings.]

A.D. 1857, July 7.—N° 1891.

HENRY, MICHAEL. — (*A communication from B. A. Soullié and G. Vigneau.*)—" Improvements in railways and wagons used " therewith in loading and discharging coals, stones, ballast, earth, " and other materials."

" To afford means for the passing of railway wagons from one " line of rails to another without turntables, by a short curved " way which may be so constructed as to be shifted bodily, when " required, by a travelling crab or similar means. The wagon is " mounted either on plain wheels on independant axles, kept on " the curved way by horizontal wheels connected to the wagon by " arms and working against the lateral faces of the rail, or on " wheels of differential diameters, or when its wheels are flanged " as ordinarily additional loose wheels are added to carry it on " the curve; the rails of the curved way being for such wagons of " higher level than those of the rest of the line."

[Expired 3rd year. Printed, 1*s*. Drawing.]

A.D. 1857, July 13.—N° 1940.

McKAY, MURDOCH, and OSMAN, HENRY FORFAR.—" Im- " provements in apparatus for securing the points of railway " switches."

" To ensure the close contact of the points of railway switches " with the fixed rails when so required, previous to and during " the passage of trains over them, so as to prevent the possibility " of the carriages being accidentally turned out of their track; " and this effected by means of an apparatus composed of a clip " or clutch, with space between its jaws to receive the lower parts " of the fixed rail and the switch point. The clip or clutch is " supported on an axle, which turns on suitable bearing fixed " below the rails, and is worked by a hard lever situated near to " the rod lever for adjusting the movable rails or switch points, " so as to be conveniently within reach of the pointsman who will " work it. The inner faces of the clip or clutch are inclined to " correspond with the tapering end of the switch point on the one " side, and a similar shaped piece of metal secured to the rail on " the other side, for the purpose of rendering the hold of " the clip or clutch firm and secure when turned on the points. " The head of the inner jaw of the clip or clutch is enlarged to

" an extent sufficient to act as a wedge between the near rail and " its corresponding switch, when the switch point on the opposite " side is required to be secured to its neighbouring rail."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1857, July 13.—N° 1948.

NEWTON, WILLIAM EDWARD.—(*A communication.*)—" An improved construction of portable railway for steam traction " engines on common roads or land."

" In constructing the railway of two endless chains of short " rails joined together vertically and laterally or horizontally, and " working over quadrilateral pulleys mounted in adjustable frames, " and so arranged that as the engine is propelled along the rails " are laid down in front, and form in effect a continuous line of " railway for the wheels to travel over."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1857, August 1.—N° 2096.

MAW, EDWIN.—" Improvements in constructing railway crossings, points, and switches."

" For these purposes the point rails, the wing rails, and the " check rails of crossings, and the stock rails and tongue " rails of switches, are made of wrought steel; and in order to " give strength and stiffness to crossings, horizontal bars of angle " iron are used between the wing rails, the points, and point rails, " and such rails and strengthening bars are bolted at intervals. " Like horizontal bars are used between the stock and tongue " rails of switches to give strength and stiffness thereto, and are " fixed to the stock, or to the tongue rails. The tongue rails " of switches are also made with ribs on the inside and outside."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1857, August 4.—N° 2112.

CAMBRIDGE, WILLIAM COLBORNE.—(*Provisional protection only.*)—" Improvements in the construction and working of endless travelling railways."

" First, by preventing the ends of the portions forming the " railway from digging into the ground and from taking up dirt " and refuse matters at the joints; and, secondly, by preventing

" the wheels from slipping at the ends of the lengths of rails. " Shoes or flat bearings are suspended which will drop upon the " ground just before the descent of the links to which they are " respectively attached, and thus receive the end pressure of " joints or links, instead of allowing the ends to press into the " soft ground. Upon the inner face of the links are formed ears " or projections, which act as guides to the wheel as it passes over " the rail, but they are intended chiefly to form bearings for a " series of pins or lateral projections on the wheel, which pins, as " the wheel revolves, come in front of the ears, and acting as " stops prevent the wheel from slipping back on the rail. When " these ears are not employed as guides to the wheel, guides are " fitted to the other side of the rails, and form an annular slot " near the wheel's periphery for the guides to work in."

[Printed, 4*d*. No Drawings.]

A.D. 1857, August 15.—N° 2176.

HADDAN, JOHN COOPE.—(*Provisional protection only.*)—" Improvements in the construction of railways, and of the carriages " to be used therewith or thereon."

"This invention has reference more especially to localities and " circumstances in which it becomes desirable as far as possible " to economise the lateral space or width to be occupied by the " intended railways, and is particularly applicable to and intended " for the extension of traffic along the general line of streets, " roads, or ways.

" By constructing and disposing such descriptions of ways in " two or more lines lying in general course, direction, or plan, " longitudinally one over the other, and also in constructing, disposing, or arranging such combined ways with lifts or inclines " for shifting the carriages from one line to the other, or forming " a communication betwen the different levels or altitudes of the " higher and lower separate ways of which the combination " consists."

[Printed, 4*d*. No Drawings.]

A.D. 1857, August 25.—No 2248.

PARRY, HENRY.—" Improvements in the construction of rails " for railways or tramways."

In forming the ends of rails for a few inches either of a solid rectangular shape, so as to lap over each other, or in one end of some of the rails a mortice is formed, and other rails are formed with tenons fitting thereunto; or the ends of the rails are connected together after the manner of a puzzle joint. The ends of the rails may be securely held together by bolts and nuts. The section of the other part of the rails may be similar to that ordinarily employed.

[Expired 3rd year. Printed, 8*d*. Drawings.]

A.D. 1857, August 31.—N° 2284.

CLARK, WILLIAM.—(*A communication from A. Joseph Florin.*) —" Improvements in the application of portable rails or ways to " vehicles."

"The wheels are surrounded with a system of rails or plates " connected end to end. These rails are developed one after " another under the wheel, which travels on them. Motion is " imparted to the system of 'endless rails' either by the wheel " itself or by any other mechanical means; for example, by means " of a pressing cylinder or roller fitted behind the carriage, which " presses on the upper part of the rails, and thereby causes them " to move as rapidly as the wheels. In order to prevent the rails " dragging behind by reason of the shocks received, the jointed " system of rails are so arranged that the upper part which is in " contact with the wheel is smaller than the lower part on which " the wheel rolls. The wheel is thus furnished with more rails " than are required.

" In order to make up for the inequality in the thickness of the " rails, a spring is used which gives the pressure to the regulating " roller. Each rail as it is unrolled passes a scraper, which " removes the mud or soil from its surface."

"Instead of the rails being jointed they may be continuous, " and by means of a mechanical contrivance form a second or " moveable felloe round the felloe of the wheel, on which second " and moveable felloe the first felloe will roll." The patentee says, " with this system a man can draw 2,000 lbs. weight in a car- " riage."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1857, September 4.—N° 2314.

RAMIE, Charles William.—" Improvements in constructing " the permanent ways of railways."

" Firstly, in a mode of supporting the rails of railways by means " of a hinged or jointed sleeper the sides of which incline upwards " in a manner similar to that described in his patents April 4th, and " September 29th, 1856; the wings are jointed together near to " their lower extremities, so that a weight pressing upon the rail " shall cause the chairs or jaws to grip and hold the rail firmly " between them.

" These sleepers may be made of various forms, or constructed " so as to form a continuous support for the rail, or placed trans- " versely thereto, and made sufficiently long to replace the gauge " or tie bars."

" Secondly, in a mode of securing rails in or to their chairs by " clips or jaws resting or abutting on the chairs, so that pressure " upon the rail shall cause the jaws to close and hold the rail " firmly between them. Chairs thus constructed may be used " in connection with wooden or other sleepers, and formed with " or attached to metallic sleepers."

[Printed, 8*d*. Drawing.]

A.D. 1857, September 10.—N° 2358.

FENTON, James, THOMSON, William, and SNOWDON, Thomas.—" Improvements in the permanent way of railways."

" In forming joint and other chairs of a combination of wrought " and cast iron, the latter being cast on to the former, and the " two when combined forming a chair in one piece or mass, the " arrangement being such that the rail or rails are held in the " chair on the same principle as a piece of iron or other material " is held in a vice when being operated upon by a workman; the " bolts and nuts or keys which secure the rail or rails to the com- " pound chair are thus prevented from slacking back or becoming " loose.

" The cast-iron portion of the compound chair may be cast on " to the wrought-iron portion at or about the centre of its length, " or at each end of it, or both, and the cast-iron portion may be " increased in dimensions so as to form the sleeper or bearing " which carries the upper structure of the permanent way on the " ballast."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, September 12.—N° 2376.

EDWARDS, John.—(*Provisional protection only.*)—“ Improvements in railways to facilitate locomotive engines ascending inclines.”

“ For these purposes there are additional or double rails laid on inclines, between which the flanges of the wheels of the locomotive engines enter, the rails fitting the flanges tightly on either side; or, in place of double or pairs of rails, the rails are made with inclined sides, and the wheels of the locomotive engines are made with double flanches at such a distance apart as to fit tightly on the inclined sides of the rails.”

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 17.—N° 2413.

GREAVES, Hugh.—“ Improvements in constructing the permanent ways of railways.”

The patentee says, “ According to the first part of this invention I make the sleepers, when used for the bridge or foot rail, flat upon the top to form a seat for the rail. The part of the sleeper or bearing plate that is not covered by the rail will curve outwards, the convex side being uppermost, and it will be strengthened by ribs cast on the upper and under side. In some cases I form these cast-iron sleepers with corrugations, or semicircles at right angles to the line of rails. In securing flat-bottomed rails to these sleepers on the inner side, I cast a fillet or long low jaw, under which the flange of the rail rests, and on the outer side one or more jaws are cast, between which jaw or jaws and a fish plate bearing against the rail I insert a piece of wood, which is secured to the sleeper by one or more bolts passing through the sleeper and keeping the fish plate tight up to the rail. A plate, similar in section to the fish plate, but not so long, is likewise used for the intermediate sleepers. This piece of wood may, in some cases, both act as a key and a wedge, and may extend from one sleeper to the other, so as to give continuity to the line of rail, and prevent unequal depression in in wet places; or it may be continued throughout the length of the rails and sleepers to give the latter additional strength.”

[Printed, 8*d*. Drawing.]

A.D. 1857, September 18.—N° 2427.

ANDERSON, Sir James Caleb.—(*Provisional protection only.*) —" Improvements in locomotives and other carriages."

Nearly the same as in his Specification, N° 765, 1857.

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 18.—N° 2430.

WEBSTER, Thomas.—(*A communication from Charles Gabriel Lemasson.*)—" Improvements in the permanent way of railways."

First, in an improved construction of railway chair or support for rails, made of two pieces of angle iron, one side of which is shaped or formed to fit the section of the rail, and the rail is held between the two pieces of angle iron by means of a bolt passing through them.

Secondly, an improved joint chair or support for the ends of rails, formed of two pieces of angle iron, and between the angle iron and the rails two fish plates are placed, and bolts are placed through angle irons, rails, and fish plates, the other side of the angle iron being fixed to the sleeper.

Thirdly, in an improved construction of switch. The tongue rails of the switch are attached firmly to the fixed rails by means of fish plates, the flexibility of the tongue rails being sufficient to allow them to bend to the requisite extent, and the tongue rails are formed in two lengths, which are connected together by fish plates, so that the thin portion of the tongue rails which are most exposed to wear can be replaced without replacing the whole of the rail.

Fourthly, in forming the two wing rails of crossings in two parts, so that that portion nearest to the point of the crossing may be removed without removing the whole of the wing rail, and this portion of the rail is formed so that when one side is worn it may be turned round and expose another side to the wear; and in order to hold the middle fixed rails and the point rail, and a bolt passes through the angle irons, rails, and filling pieces, and bolts the whole together.

Fifthly, in connecting the guard and fixed rail of a crossing together and to the sleeper, by placing a piece of angle iron on the outside of the fixed and inside of the guard rail, and placing a filling piece and two fish plates between the guard and fixed rails, and bolting all together.

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1857, September 24.—N° 2469.

JOHNSON, William Beckett.—"Improvements in raising "and lowering trucks, carriages, engines, or other such railway "appendages from one level to another."

At a convenient altitude above the higher level, a steam cylinder is fixed, of sufficient length to allow a piston to travel through a distance equal to or somewhat greater than that of the required lift. To the said piston is connected the truck, carriage, &c. to be raised; upon steam, therefore, being admitted to the cylinder it will be drawn upward. Upon the required level being attained a projecting part arrives in contact with apparatus for cutting off the steam so as to arrest the motion of the piston. For lowering the apparatus the steam is allowed gradually to escape through a cock or other suitable apparatus.

In employing pneumatic power, air is forced into a receiver, from which it is admitted, when required, into a cylinder. In order to check an undue impetus of the body being raised or lowered, buffers of india rubber are used above and below, and this is applicable to other machinery used for the same purpose.

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1857, September 29.—N° 2504.

WELCH, James.—(*Provisional protection only.*)—"Improvements on carriages and portable railways to facilitate their "movement on common roads and other surfaces."

"The railways are each composed of an endless chain of rails, each "link or rail of which is formed of two bars of iron rivetted at "one end of them to a foot or shoe. The endless chain is carried "round the bearing wheels of the carriage, and laid down before "them, and lifted again behind by means of two wheels which "are called conducting wheels, one placed before and the other "behind the bearing wheels. As the chain travels over the conducting wheels, their peripheries pass between the parallel bars "of the links and into grooves in the shoes, by which means the "chain is secured in its proper position throughout its revolution."

[Printed, 4*d*. No Drawing.]

A.D. 1857, September 30.—N° 2513.

THOMPSON, Edwin, and NICHOLSON, William Joseph.—"An improvement in railway switches."

In so constructing railway switches as that the tongue rails lift clear of the chairs, instead of sliding, as commonly practised. By which the necessity for oiling the chairs is dispensed with, and the chance of sticking half open entirely obviated.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1857, October 6.—Nº 2568.

ROMAIN, ROBERT.—"Improvements in machinery for digging "or cultivating land, part of which improvements is applicable "to agricultural steam engines generally."

The patentee says,—"The chief object is to increase the "efficiency of the steam cultivators for which letters patent have "been obtained on my behalf, by facilitating their traverse over "the land, and bringing the operating parts more completely "under the command of the attendant."

"In order to improve its travelling powers I apply to the "running wheels a novel arrangement of portable way, which "forms a kind of endless platform for each of the wheels to run "on, and this part of my invention I also propose to apply to "agricultural steam engines generally."

[Printed, 2*s*. Drawings.]

A.D. 1857, October 15.—Nº 2644.

WALKER, CHARLES.—(*Provisional protection only.*)—"Im"provements in atmospheric railways."

"The arrangement and working of atmospheric railways, with a "solid tractive pipe in place of the usual open valve pipe. It is "intended for use more especially for branch lines, and for colliery "and general subterranean purposes. The working piston tra"versing the pipe is connected to the two ends of a traction chain "or rope which pass out at the two ends of pipe, being supported "externally along the entire exterior of the pipe from end to end "in carrying pulleys. In this way, as the air is pumped out from "one end of the tube, the attached chain draws the train in the "contrary direction."

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 17.—Nº 2656.

BADGE, RICHARD JOHN.—"An improved mode or method of "*securing* railway chairs to the sleepers."

"Instead of the usual trenail or spikes for securing them to the "sleepers, fasteners are used, composed of two or more pieces "similar to a mason's lewis."

"These improved trenails or fasteners have a compound slot in "the direction of their length, into which a metal key of parallel "thickness is firmly driven after the wooden trenail or other side "pieces have been driven into their places. The key or centre "piece is furnished with a head, by which it can be drawn out "when required."

[Expired 3rd year. Printed, 6*d.* Drawing.]

A.D. 1857, October 20.—N° 2682.

WINDHAUSEN, Frances.—"Improvements in increasing the "adhesion of the wheels of locomotive engines to rails when "moist."

"In drawing the heated products of combustion from the smoke "box of the engine and forcing them on to the rails, in order "to dry them."

"For this purpose the steam after it has acted on the piston "instead of being allowed to escape direct into the chimney, is "passed through a pipe turning in bearings. On the end of this "are curved lateral pipes, through which the steam escapes into "the chimney and causes the pipe to rotate. On the pipe below "the lateral pipes is a disc, which closes the bottom of the chimney, "and below this a fan which works in a chamber opening into "the smoke box. As the pipe rotates the fan draws the heated "products from the smoke box and forces them down through "pipes on each side of the engine on to the rails. In these pipes "are valves, by which the passage through them can be closed, "and at the bottom of the chimney is a valve to permit the products to pass off through the chimney when the passage through "the pipes is closed."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1857, October 22.—N° 2691.

BETHELL, John.—"Improvements in machinery or apparatus "for trenching, cutting, digging, and cultivating land."

"The invention has reference to locomotives in which rotary "cultivators are employed and worked in, by, and with the same "engine or power which effects the locomotion, and consists in

" constructing such apparatus in combination with a self-laying " railway.

" The said railway or roadway being constructed of a series of " separate slippers, shoes, or pieces suitably disposed around the " circumference of the wheels."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1857, October 23.—N° 2701.

PARKER, BENJAMIN.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

" Relates to sleepers and chairs, and the mode of connecting or " fitting them together, and laying them down. And consists in " forming hollow cast-iron sleepers of a parallelogram or other " suitable form in plan, with downward bevilled flanges forming " the sides and ends, the surfaces of such chair being cored with " holes to reduce the weight thereof, and enable the ballast packing to be rammed up and consolidated, or otherwise treated for " the purpose of adjusting the position of the sleeper upon the " road.

" On the upper surface or face of the sleeper is formed a recess, " by means of fillets surrounding it, for the purpose of containing " an elastic packing bed-piece or spring."

" The chair is formed with a flat bottom, for the purpose of " resting upon the elastic bed piece or spring, the bearing being " increased considerably longitudinally as compared with the " ordinary chair for wood sleepers, so that the bearing surface is " suitably enlarged by increasing the length of the chair in the " direction of the line of road."

[Printed, 4*d.* No Drawings.]

A.D. 1857, October 28.—N° 2725.

IRLAM, WILLIAM.—(*Provisional protection only.*)—" Improvements in wrought-iron railway chairs, sleepers, and crossings."

" In making railway chairs in two parts, secured together by a " bolt passing through them and through the rail. And then " secured to a sleeper of the usual construction, or to a wrought- " iron plate, either hollow or flat. The wrought iron for the " chairs is rolled to the required section to fit between the shoulders of double-headed rails, and to fit around or partly around " the lower shoulder. The rails are kept to guage by tie bars, or

" by making some of the sleepers of sufficient length, and placed " transversely, so as to have a chair near each end."

" When the chairs are of rolled iron, the bars must be cut to " the required lengths, but instead of being rolled the chairs may " be stamped or otherwise forged to the shape required."

" The improvements in railway crossings consist in making the " point with the two side rails and the bed plate of one solid piece " of wrought iron. The crossing may be made double, that is to " say, with grooves at each side, so that when the top is worn or " injured, the lower side can be brought uppermost."

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 28.—N° 2735.

CLARK, William.—(*A communication.*)—" An improvement in " rails for railways."

" The construction of rails in such a manner as to obtain the " necessary strength with a less weight of metal than is required " in any rails heretofore used. The I or H rail and inverted T " rail both contain much metal in the head that is unnecessary " and useless, and that is dispensed with in this invention, which " consists in forming an inverted T rail with an aperture or hollow " space extending lengthwise through the thick upper portion of " the rail."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1857, November 4.—N° 2800.

MURPHY James.—(*Provisional protection only.*)—" Improve- " ments in the permanent way of railways."

It is proposed " to make a 'fish plate' by first taking a flat " iron plate, on the centre of which the ends of two rails will rest " longitudinally, and having rolled out or cast a pair of plates in " such wise that one may be placed on each side of the rail cover- " ing the first plate, and running up the rail till they arrive under " the top thereof, and fitting exactly the form or shape of the " rail, and serving to support the same, the joint of the rails being " in the centre of the first plate, and now supported by the plates, " the whole combination is to be secured or fastened together. " This is effected by passing several screw bolts through the lower " and one of the upper plates, and securing the same by nuts, to

" allow the removal of the rail when required. The plate on the " other side will be rivetted only."

[Printed, 4d. No Drawings.]

A.D. 1857, November 6.—N° 2818.

ANDERTON, WILIAM.—(*Provisional protection only.*)—" New " railway chairs."

" These chairs are of iron metal cast in halves longitudinally. " There is a sufficient thickness of metal in the chair under the " rail to admit of the two halves being bolted together underneath " the rail after the rail has been placed in the chair. This is " effected by a wrought-iron bolt or bolts through the chair, thus " obviating the bolting through the rails."

" The whole of the lower head and neck of the rails are covered " by the chair, which keeps the rail perfectly steady and tight."

[Printed, 4d. No Drawings.]

A.D. 1857, November 6.—N° 2819.

BESSEMER, HENRY.—" Improvements in the manufacture of " malleable iron and steel, and also in the manufacture of railway bars and other bars, plates, and rods from iron or steel so " manufactured."

The patentee says, " When malleable iron or steel is obtained " by the decarbonization of crude, pig, or refined iron, by the " passing of air or steam through the molten metal, or by the " cementation of the iron with oxides and other matters.

" In consequence of the peculiar crystallization of the metal, or " from the combination of oxygen therewith, or from other " causes, such ingots are more or less hot, short, and are liable " to crack along the edges when subjected to the ordinary process " of rolling or hammering."

" The object of my invention is, to lesson or entirely remove " these defects. For this purpose I construct a circular mould, " which I mount on a vertical axis in a strong iron frame, and " which is made by suitable gearing to revolve rapidly in the " central part of the mould. I fit a disc, around which a cavity " is formed somewhat of the shape required to form the rim of a " fly wheel, the upper part of the mould being open in the central, " part and covered at the edges, when molten malleable iron or steel " *is to be cast* according to my present invention. I run or pour

" such metal in a stream down upon the revolving disc of fire-" clay or other material from such a height as will cause the fluid " metal to divide itself into numerous globules, and thus favour " the extrication of carbonic oxide or other gaseous matter from " the molten metal, and which globules will be again collected " at the periphery of the mould, and be carried round with it " and be thereby subjected to considerable pressure by reason of " the centrifugal force generated by its rapid rotation, and thus " be formed into a ring or hoop, having a square, octagonal, or " other sectional form, depending on the internal form of the " mould, and of a dense and solid texture, owing to the peculiar " arrangement of the particles of molten metal before or during " the period of solidification."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1857, November 7.—N° 2821.

BAINES, Hugh.—" Certain improvements in machinery or " apparatus for the prevention of accidents, applicable to hoisting " and other lifting machines."

" Relates to hoists employed upon railways for raising and " lowering wagons, &c., and consists in the application of india-" rubber or other springs in conjunction with levers, connecting " rods, and catches placed underneath the table or platform, and " so constructed and arranged that when any one or more of the " four suspending chains of the hoist breaks or becomes discon-" nected, all the catches shall immediately be forced outwards, " and catch into racks or some other similar contrivances at the " sides of the hoist, so that the descent of the box, chamber, or " platform shall be arrested at its four sides simultaneously in " the event of any such accident as above mentioned."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, November 18.—N° 2888.

BELL, William Heward.—" Improvements in the permanent " way of railways."

" In forming a continuous rail by making the rail in three " separate pieces breaking joint with each other, and effecting a " considerable economy, only one of these pieces " requiring " to " be replaced as the surface becomes worn, instead of renewing " the whole of the rail. Chairs also are dispensed with, and in " some cases nearly flat plates are employed instead."

"But the principle elementary feature of the invention consists " of a T-shaped rail, forming the head or working surface, sup- " ported by two rectangular or L-shaped rails or plates, placed " one on each side of the lower or vertical flange of the T-shaped " rail."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1857, November 19.—N° 2900.

MIRIO, Jean Baptiste.—(*A communication from M. Pluchet.*)—(*Provisional protection only.*)—" Improvements in the permanent " way of railways."

"In connecting the rails by two short plates or fishes, secured " to the rails by bolts and nuts, or otherwise, and placing this " joint in a notch in a sleeper, and applying a block of suitable " material on each side of the rails; these blocks are bevilled at " one end, which enters a notch in the sleeper, while the other " end is fitted to the side of the plate or fish. The blocks are " fixed to the sleepers by screws passing through small plates or " saddles placed on the blocks. The heads of the bolts which " secure the plates or fishes may lie on each side of and close to " one of the blocks, so as to prevent the rails from moving end- " ways."

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 19.—N° 2905.

CLAY, William.—" Improvements in the points, switches, and " crossings of the permanent way of railways."

" In manufacturing such parts of the permanent way of rail- " ways of steel bars, rolled into the required form."

" By which greatly increased strength and durability against " wear and tear or abrasion is obtained, as compared with the " points, switches, and crossings generally employed on railways."

[Expired 3rd year. Printed, 4*d*. No Drawings.]

A.D. 1857, December 9.—N° 3046.

SMITH, Joseph.—" Certain improvements in securing rails in " their respective chairs for railroad permanent ways."

The patentee says: " The object is the better adapting of " the railway chairs now commonly used to future construction " of railways, by making the keys, by which the rail is held

" (in the chair), of iron instead of wood, as great expansion and " contraction takes place with the use of wood, as it readily " absorbs and gives off moisture at all variations of temperature; " thus from the contraction which takes place in dry weather it " is evident that such keys will work loose, and be liable (from " the concussion of passing trains) to shake out altogether. This " defect is entirely obviated by the use of iron keys, in tightening " which I prefer, instead of striking them, to construct them with " a fixed flange on one end, clipping the side of the chair, and to " apply a flange on the other end of the key, to be secured by a " screw bolt passing lengthway through the key. This mode, " either on curves or straight lines, will be found thoroughly " efficient, as it is impossible, from the projecting flanges clipping " that side of the chair to which such key is applied from shaking " out."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1857, December 31.—N° 3196.

BARLOW, PETER WILLIAM.—(*Letters patent void for want of final specification.*)—" Improvements in the permanent way of " railways."

" An improved mode of constructing chairs where the rail is " seated altogether in wood, and of securing the rails in such " chairs."

" In making the cheeks of such chairs cast in one piece (whether " in combination with cast-iron sleepers or used on ordinary " timber sleepers), parallel or slightly inclined to the top of the " rail, and in the use of two wedges or keys, one on each side of " the rail."

" The advantage is the protection of the keys from the weather, " rendering them more durable and less likely to become loose, " and the means of adjusting the guage thus given are particularly " advantageous when transverse iron sleepers are used. When " used with longitudinal iron sleepers, or in ordinary chairs, one " key only is preferable, the rail being supported on the opposite " side by a wooden cushion, or other elastic material, placed in a " recess of the chair."

[Printed, 4*d*. No Drawings.]

1858.

A.D. 1858, January 19.—Nº 87.

BRUFF, PETER SCHUYLER.—(*Provisional protection only.*)—
" Improvements in the construction of submerged tunnels."

" A peculiar construction and arrangement of submarine " tunnels, and a mode of laying the same, and consists in the " application and use to and in the construction of tunnels of a " description of metal tubes made in sections or lengths of suitable " dimensions and shape, such tubes resting upon or being sunk into " the bottom of rivers or arms of the sea required to be crossed, and " are adapted for roads, railways, and other communications which " may require to be established through or under the same. The " tubes may be constructed of one, two, or more thicknesses of " plating with ribs, stringers, and kelsons, of angle iron or other " form, the whole being securely bolted, screwed, or rivetted " together."

[Printed, 4*d*. No Drawings.]

A.D. 1858, January 20.—Nº 98.

DAVAGE, CHARLES, and DAVAGE, THOMAS.—(*Provisional protection only.*)—" Improvements in railway crossings."

" In connecting the point rails for crossings with the tongue or " point piece, which is to be made of cast or wrought iron or cast " steel."

" The shape of the point piece will vary, the base of the triangle " being relatively greater or less according to the crossing for " which it may be designed; a fantail prolongation is fitted to " receive the point rails, which when in position are wedged " between the rails, and secured by a bolt."

[Printed, 4*d*. Drawing.]

A.D. 1858, January 25.—Nº 135.

DERING, GEORGE EDWARD.—" Improvements in the per- " manent way of railways."

" To obtain continuous, even, and durable rails, by connecting " together the successive separate rails, firstly, by soldering with " any suitable metal or alloy, or, secondly, by the processes known " as autogenous soldering or burning together, a sufficient degree

" of heat being applied to cause union by the partial or com-
" plete fusion of the metal of the rails; or, thirdly, by welding
" when the rails are in their proper position on the permanent
" way, an excavation being made, if necessary, for the forge,
" furnace, or other source of heat, and the successive lengths of
" rail laid down in their intended permanent positions or nearly
" so, and forced by wedging or by blows of a hammer or other-
" wise, up to the length already laid down and united, and by
" preference into very close longitudinal contact therewith."

[Printed, 4*d.* No Drawings.]

A.D. 1858, January 30.—N° 176.

ASHCROFT, **Peter.**—" An improved mode of supporting the
" rails of railways in their chairs."

" To provide a means for supporting double-headed rails in
" their chairs, so that their under wearing surface shall not become
" injured by contact with the seats of the chairs. For this pur-
" pose the rails are suspended in rigid chairs of a peculiar con-
" struction by the use of filling or supporting pieces, which may
" be of iron or wood, placed one on either side of the rail, and
" forming therewith a compound wedge."

[Printed, 6*d.* Drawing.]

A.D. 1858, February 3.—N° 196.

ARMANI, **Anthony Nicholas.**—(*Provisional protection only.*)
—" Improvements in rail or tramways for streets and ordinary
" roads."

" In casting rails with a longitudinal groove in the upper face
" thereof, in chilling their upper surface, and in forming them
" solid at top with sides carried down and terminating at bottom
" in feet or supports extending outwards therefrom. The sides in
" such manner as to leave a space between them, which is filled
" up with suitable material, and it is prefered to cast the sides
" with apertures therein. The ends of each rail may be cast with
" eyes, which project outwards from the sides, those on the out-
" side to receive bolts for securing the rails together longitudinally,
" and those on the inside to receive a bolt or other agent for con-
" necting a tie rod or bar for maintaining the guage between the
" rails."

[Printed, 4*d.* No Drawings.]

A.D. 1858, February 25.—N° 381.

ALEXANDRE, Lazare Prosper Lambert. — (*Provisional protection only.*)—" Improvements in apparatus and signals for " preventing accidents on railways."

The patentee says :—" I place at intervals along the line of " railway an apparatus having a lever or moveable part carrying " a roller, acted upon by an inclined bar attached to the carriage. " The lever is retained in its new position by a catch held in its " place by a spring, but it can be drawn back by a wire which is " conducted along the line to the next apparatus. As this next " apparatus is being set by the passage of the train, its lever pulls " the wire and thus releases the lever of the first apparatus. These " levers carry or are connected to signals or turning discs; thus, " if a train arrives at one of these apparatuses, the signal at once " indicates to the driver whether the previous train has yet passed " the next apparatus."

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 4.—N° 427.

URE, James Millar.—(*Provisional protection only.*)—" Improved apparatus for lifting the driving wheels of a locomotive " off the rails, and which can be used when the locomotive is " either running or stationary."

" The improved apparatus is applicable to any locomotive con-" structed, so that it is sufficiently supported, and can run on its " other wheels when the driving wheels are lifted off the " rails."

" According to one plan the desired effect is produced by " lifting the driving wheels in the guides in which their axle-" boxes work. According to another, by depressing the leading " and trailing wheels, and this has the effect of raising the loco-" motive, and with it the driving wheels, the axle-boxes of these " last being previously locked to cause to be lifted by the framing " of the locomotive."

" Two steam cylinders are fitted up in suitable situations upon " the locomotive, the pistons being connected to the mechanism " which directly acts on the wheels. The steam is admitted to " the cylinders by pipes, the stop valves of which can be con-" veniently opened or closed by the engine driver, and when he

" wishes to lift the wheels of the rails he admits steam into the " cylinders."

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 6.—N° 447.

MOATE, Charles Robert.—" Improvements in the per- " manent way of railways."

" The invention has reference to that description of permanent " way in which longitudinal bridge or saddle metal rails are laid " directly upon the ballast, and consists in filling up or partly " filling up the hollow space or under side of such rails, or in " covering over or partly covering over such under side or sur- " face so as to facilitate the packing of the ballast when being " laid, repaired, or packed up. And in the application of short " tie rods or plates to the under side of the said rails, and across " the hollow or open space, so as to prevent the rails from opening " or spreading or becoming flattened, or so as to hold the " substance or material employed for filling up the hollow " space.

[Expired 3rd year. Printed, 10*d*. Drawings.]

A.D. 1858, March 6.—N° 457.

REED, William.—(*Provisional protection only.*)—" Improve- " ments in the permanent way of railways."

" An improved means of connecting the ends of the rails, and " holding them in joint chairs. For these purposes fish-plates " are employed, formed to fit the section of and pass under the " rails, the fish-plates and rails being held in a joint-chair by " means of bolts passing through the rails, the fish-plates, and " one jaw of the chair, and also by a wooden wedge driven " between the fish-plate and the other jaw of the chair. The " rails are also fixed to the fish-plates by means of bolts exterior " of the joint chair passing through the rails and the fish-plates. " The bolts are retained by screw nuts."

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 18.—N° 554.

ANDERSON, Sir James Caleb.—(*Provisional protection only.*) —" Improvements in locomotive or other carriages."

Exactly the same as in his Specification, A.D. 1857, N° 765.

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 20.—N° 578.

PARSONS, Percival Moses, and DEMPSEY, William.—(*Provisional protection only.*)—" Improvements in the con-" struction of switches and crossings for railways."

" In constructing switches from flat bottom rails and con-" necting the heel of the tonge to the ordinary rails by means of " fishing-plates, and tapering the point off, and housing it under " the main rail. In the construction of crossings from similar " rails, and applying rails, bars, or plates between the wing rails " and the wing and point rails for the flanges of the wheels to " run upon. Also in the construction of crossings applicable to " other forms of rails as well as the above, and constructing the " points and wing rails of rolled or forged steel or steel iron, and " of such a form that the flanges of the wheels can run upon " them. And in constructing crossings by cutting bars of " suitable sections in two diagonally, reversing the two parts, " and uniting them firmly together by bolts, rivets, or otherwise; " the bars may be of such sections that when thus treated they " will form either the point rail or the point and wing rails " together, and so that the flanges of the wheels may run upon " them or not."

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 25.—N° 625.

CLARK, William Stettineas. — (*A communication from Sidney A. Beers.*)—" Improvements in the construction of rail-" ways."

" An iron foundation rail is used, of the form of a series of " upright arches, resting on stone or other substantial foundations, " and tied together laterally by upright iron ties, and with a " wrought-iron coping rail fitting into the top of the said foun-" dation rail, and extending downwards on each side thereof, " terminating at the bottom in flanges to receive clamps or " hooks, which are held in place and tightened upon the said " flanges, thereby confining the said coping rail to the foundation " rail by means of key wedges or their equivalents; the said " coping rail breaking joints with the foundation rail so as to " form a continuous track, and having lock joints of such form " and construction that the adjacent ends of two lengths of rail

" cannot rise independently of each other, and that the breaks in " the face of the track at the junction of the several lengths of " rail are oblique and not directly across the face of the rail. To " overcome the too great solidity of the permanent way, a strip of " gutta percha, lead, wood, or other elastic substance, rolled in " the form of a segment of a circle, may be placed between the " top of the foundation rail and the coping rail, where it is con- " fined as it were in a box formed in the interior of the coping " rail, thus overcoming the too great solidity which would result " in a track composed entirely of iron with stone foundations."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1858, March 27.—N° 653.

WELCH, James.—" Improvements in portable railways, and in " the means of their application to carriages to facilitate their " movements on common roads and other surfaces."

" The railways are used one on each side of the carriage, and " composed of an endless chain of rails jointed together. The " bearing wheels of the carriage are each a double wheel having a " flange inside and outside, and are composed of two sets of " spokes and felloes, with an interval between each set. Each of " the railways is supported and guided round the bearing wheels " by two wheels or drums placed anteriorly between the sections " of the double bearing wheels. The distance of the drums from " each other is capable of adjustment at pleasure by means of a " screw, according to the length and required tension of the chain " of rails. Each link of the railway is composed of two parallel " bars of iron having a space left between them, and firmly " fastened at one end to a foot or shoe of iron and wood of a " suitable length and breadth, according to the load and the " nature of the ground, and at the other end to another piece of " iron, forming a joint with the foot of the adjoining link. And " formed with a tongue projecting forwards beyond the joint of " its iron link between the parallel bars of the next adjoining " link, throughout or nearly throughout its whole length towards " the next joint, the points of each of the tongues taking on to " the forward drum at the antecedent joint of the chain, and " conducting each link smoothly onward over the drum to the " next joint in endless succession."

[Printed, 10*d*. Drawing.]

A.D. 1858, March 30.—Nº 671.

DURAND, JEAN CLAUD.—" Improvements in the manufacture " of iron."

The patentee says, " Heretofore in the manufacture of iron for " rails, girders, beams, axles, and other articles, but little or no " regard has been shown to the relative positions occupied in the " mass of iron by the several elements of the pile from which the " said articles have been manufactured. Now, my invention " consists in so combining such elements that each of them considered by itself shall occupy in the finished article the position " most favourable to the exercise of its maximum strength when " subject to the forces which it is destined to bear. By this " means their aggregate strengths, that is, the strength of the " article which they compose, will be greater than under any other " circumstances. Thus, for example, the component portions or " elements of a horizontal beam or bar of iron intended to " sustain a downward pressure will be placed side by side, with " their edges upward and downward."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1858, April 14.—Nº 803.

HOLMES, WILLIAM CARTWRIGHT, and HOLLINSHEAD, WILLIAM.—" Improvements in the manufacture of metal castings."

" Firstly, in the use of ordinary or superheated steam, hot air, " or hot water, introduced or passed through chambers or passages formed in metal moulds for maintaining the said moulds " at, or as near as possible, an equal temperature during the " process of casting.

" Secondly, in the employment of superheated steam or hot " air for drying the cores of pipes by passing the same through " the core barrel, and for drying other cores and dry sand moulds " by placing them in a suitable vessel having a 'jacketing' or " chambers for passing the steam through."

The above method is described as applicable to the moulding of railway chairs.

[Printed, 8*d*. Drawings.]

A.D. 1858, April 15.—Nº 821.

HARRIS, JOHN, and SUMMERSON, THOMAS.—" An im" *provement* in railway chairs."

"It consists in forming recesses on the under sides of chairs
" in such manner as to receive hollow pieces of wood, through
" which and through the upper surfaces of the chairs the pins or
" bolts are driven, so that the wood forms bushings around the
" pins or bolts which are driven through to hold down the
" chairs. The recesses for holding the wood are of larger
" diameter than the holes through the upper surfaces of the
" chairs, so that the wood cannot be drawn through from the
" under surfaces of the chairs."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1858, April 19.—N° 849.

WESTHEAD, Marcus Brown, and BAINES, Hugh.—(*Provisional protection only.*)—"Certain improvements in machinery
" or apparatus for the prevention of accidents, applicable to
" hoisting and other lifting machines employed in connection
" with railways or other places where heavy bodies require to be
" moved from one level to another."

"These arrangements of mechanism consist of levers which
" by means of weights or springs are made to assume a position
" and act as scotches to a waggon, truck, or other carriage on to
" the platform, and to prevent such carriage from moving off the
" platform during its ascent or descent, the position of these
" levers being changed by mechanism in connection with the
" platform of the hoist, so as to allow a free passage of the
" carriage when the platform of the hoist is in its correct
" position."

"And in arrangements of mechanism to disconnect the motive
" power from the machinery which regulates the ascent and
" descent of the hoist, in case one or more of the ropes or chains
" by which the platform is suspended should break, immediately
" to apply the brake to prevent its descent."

[Printed, 4*d.* No Drawings.]

A.D. 1858, April 21.—N° 879.

PARKER, Benjamin.—"Improvements in the permanent way
" of railways."

Exactly the same as in his former Specification, A.D. 1857, N° 2701.

[Expired 3rd year. Printed, 8*d.* Drawing.]

A.D. 1858, April 28.—N° 943.

MARTIN, **Brooke**, and **LIGHT**, **Charles Julian**.—"Imments in railway turntables."

"In combining a solid bearing for turntables when not in action, with the use of rollers upon which to move when turning, these rollers being at such a level that when the table is on its solid bearing it is in no way supported by them."

"The table is prepared for use by raising it off its dead bearings at four or more points on its circumference by means of counterbalance weights or otherwise, and it may then be lowered on to the rollers by means of counterbalance weights or otherwise, and it may then be lowered on to the rollers by means of pillow blocks, or the rollers themselves may be so connected with the counterbalance levers as to rise with the table and support it while turning."

[Expired 3rd year. Printed, 1*s*. 2*d*.]

A.D. 1858, April 28.—N° 946.

CLARK, **William**.—(*A communication from Emile Poiret.*)—"Improvements in railway crossings."

"When a carriage enters the crossing at the heel of the switches, the flanges of the wheels interpose between the fixed counter rail and the inside movable rail, and will always compel this latter to communicate with the only line of way. This is the same in the ordinary crossings."

"When the vehicle enters at the point end of the switches, it is also guided by the fixed counter rails, which preserve a distance of an inch and a quarter or more between the flange and the extremity of the movable rail. This apparatus can be worked under snow, whereas in the ordinary crossings the line would be deranged in its working, and a wheel once entering its flange between the fixed counter rail and the inside movable rail is held in proper position, and the wheel following next necessarily goes on to the same line, although a force should tend to change the action of the apparatus."

[Expired 3rd year. Printed, 10*d*. Drawings.]

A.D. 1858, May 1.—N° 978.

TALABOT, **Leon**.—"Improvements in rolling railway and other *bars.*"

" In rolling bars, when three high rolls are employed," they are " formed according to this invention with flutes, and the " metal in rolling is passed alternately between the middle and " upper rolls, and the middle and lower rolls. Thus the spaces " between the rolls are always enclosed by grooves in the lower " and projections on the upper of the two rolls, between which " each of such spaces is formed, except when passing a railway " bar for the last time through the rolls, when in order to round " off the top of the rail the space between the rolls is enclosed by " grooves in each roll. The distances between the rolls in a " vertical direction are adjusted by means of wedges acted on by " screws, the wedges being placed between the bearings of the " rolls. The bar coming from the lowest grooves is raised by " means of a lever, which is suspended from the axis of a wheel, " which runs on a rail above the rolls. The rail is connected " with levers, so that it may be raised by means of a lever, which " is suspended from the axis of a wheel which runs on a rail " above the rolls. The rail is connected with levers, so that it " may be raised and lowered. By these means the bar may " readily be moved sideways, in addition to being raised and " lowered."

" The other part consists in rolling round bars of iron."

[Printed, 6*d*. Drawings.]

A.D. 1858, May 7.—N° 1030.

BROWN, THOMAS, and BROWN, DAVID.—" New or improved machinery for filing or smoothing the ends of fish-plates, rails, wrought-iron railway chairs, and other articles " made by sawing bars transversely."

" In the removal of the fringe or burr left on the ends of " articles made by sawing bars transversely."

[Expired 3rd year. Printed, 10*d*. Drawings.]

A.D. 1858, May 12.—N° 1072.

JACKSON, JOSEPH GRATIAU.—(*Provisional protection only.*)— " A method of carrying rods over (or through) land covered with " water."

There is placed " upon the surface of the water, a water-tight " tube, open at the ends, and of a sufficient length and diameter.

" In some cases the tube may be constructed of wood, but iron
" will usually be found the cheapest and best material for the
" construction of it."

" The roadway is laid down in the interior of the tube, which
" may be enclosed in another similar tube or tubes for great
" security."

" When complete the tube or tubes are to be sunk in the water
" on to the solid ground, which must be prepared, so as to form a
" solid and secure bed to receive the tubes. The tubes may be
" wholly or partially imbedded in the ground, if desired."

[Printed, 4*d*. No Drawings.]

A.D. 1858, May 19.—N° 1111.

BROWN, JEREMIAH.—" Improvements in the manufacture of
" iron, and in rolling iron and steel, and in machinery to be
" employed therein."

" A percussion machine, for compressing and fashioning masses
" of iron, either in the puddling furnace or in the heating furnace.
" A hammer works through a hole in the top of the furnace.
" This, hammer is connected with a steam cylinder, and worked
" up and down after the manner of an ordinary steam hammer.
" By this hammer the ball of iron may be fashioned into any
" desired form while under the influence of heat. Also, by the
" said machine iron of different qualities may be united, or puddled
" steel may be united to puddled iron for rolling rails and other
" bars."

[Printed, 2*s*. 2*d*. Drawings.]

A.D. 1858, May 19.—N° 1116.

MILLER, GEORGE MACKEY.—(*Provisional protection only.*)—
" Improvements in the joints of bridge rails for railways."

" For this purpose joint chairs are employed made with two
" jaws which project over the flanges of the rails, and with a
" central ridge which enters the hollow under the rails; this
" ridge prevents the ends of the rails from shifting laterally, and
" metal keys driven in between the flanges and the jaws of the
" chair prevent them from moving vertically. Chairs of this con-
" struction may be used advantageously either with transverse or
" longitudinal sleepers."

[*Printed*, 4*d*. No Drawings.]

A.D. 1858, May 21.—N° 1130.

BRANT, JOHN CHARLES.—“ Improvements in the permanent way of railways.”

“ It is proposed to make railways both imperishable and indestructable. They may be formed of potters' clay, Stourbridge clay, refuse of glass works, or other similar materials, and may be moulded to any necessary form or size while the materials are in a plastic condition, and when formed they undergo the process of kiln-drying or burning, according to the nature of the materials used. The sleeper may be formed with or without the chair attached, which chair may be made of the same material as the sleeper. Bolt holes may also be formed in these sleepers and wooden trenails used; or the sleeper may be formed with a groove to admit the rails, under which is placed a cork packing.”

“ When any of the usual kind of iron chairs are used, the place for fixing the chair can be moulded on the sleeper.”

“ The improved rails are composed of wood and iron, the wood forming the interior and being slightly raised. Another rail is of metal only, and is a single-headed rail of a V pattern fitting into groved shaped intermediate sleepers.”

[Expired 3rd year. Printed, 4*d*. No Drawings.]

A.D. 1858, May 28.—N° 1200.

DUNN, THOMAS, and IRLAM, WILLIAM.—“ Improvements in machinery for altering the position of locomotive engines and carriages on railways.”

“ In machinery for turning ordinary turntables by power, and consists in casting a flange at the lower edge of the ring of the turntable top, by which greater strength and a saving of labour is effected.”

“ In making turntables of large dimensions with bowstring sides or with tubular stays, to avoid the necessity of deep pits.”

“ In making the ends of the traverser's rails of iron or steel plates forming spring points, which points are depressed by the wheels of the carriage that is being pushed on to or off the traverser.”

“ In making the ends of the traverser rails to swivel on fixed "studs, and in such wise that the inner ends thereof overbalance "the points, thereby raising the points clear of the rails while "the traverser is being moved, but when an engine or carriage is "being placed on or off the traverser the wheels depress the "points of the traverser until they bear on the rails of the permanent way, thereby forming the inclines for the wheels of the "carriage."

"In placing the cross tram rails for the traverser on different "levels the outer rails are level with the permanent rails, and the "inner rail or rails are raised sufficiently to act as guides; and "in making a portion or portions of the cross tram rails for the "traverser capable of being raised or lowered by suitable "machinery, so that one end of the traverser may rest on the "main line, or that the whole traverser may rest on the main line "when the engine or carriage is rolled on to or off the traverser; "and that the whole traverser may be raised when it has to be "moved laterally."

[Expired 3rd year. Printed, 1*s.* 2*d.* Drawings.]

A.D. 1858, June 1.—N° 1229.

VASSEROT, Charles Frédéric.—(*A communication from Antoine Gaud.*)—(*Provisional protection only.*)—"A kind of "tramway to facilitate the locomotion of bedsteads."

"And to effect this, under the casters a sheet-iron band of "suitable width is fixed, having a small projecting flange] on "each side. The two rails are nailed or screwed to the floor. "By means of this arrangement the bedstead can be moved by "the slightest force."

[Printed, 4*d.* No Drawings.]

A.D. 1858, June 4.—N° 1258.

DICKSON, John Farmerley.—"Improvements in the permanent way of railways."

"They relate to permanent ways in which wrought iron is "principally used, and in which the bearing surfaces are laid "longitudinally and continuously in the direction of the road. "It is proposed to form the wings or sleepers out of one piece of "plate iron, about one-third of an inch in thickness, in which is "formed a groove running its entire length, into which is placed

" the vertical limb of a single-headed rail of a new and improved " form, which arrangement prevents any stress on the screw bolts " attaching the wings to the rails, and requires a less number of " fastenings. A new and improved form of cast or wrought iron " sleeper is used, either detached or continuous, or in connection " with the rails in ordinary use. Notches or teeth are also formed " in the ends of bolts or screws employed in the permanent way. " And catches are placed on the nuts or other parts to which the " screws are fitted, so that the catch may fit in the notch and " prevent the bolt or screw becoming loose."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1858, May 4.—N° 1259.

MERIGHI, VITTORIA.—(*Provisional protection only.*)—" Means " for preventing dust on railroads.

" In providing, in case of great drought, each train, or a suit-" able number of them, with a special water provision, which, by " suitable mechanical arrangements is to be distributed over the " track, so as to keep the earth of the line sufficiently moistened " for preventing dust. For this purpose the capacity of the water " reservoir of the tender may be sufficiently increased, or a special " tender for carrying the water may be made use of; and in order " further to make the water subservient for cooling the air, suit-" able frames or other arrangements, provided with linen, wire " cloth, felt, or other pervious open materials, may be applied in " suitable positions to the train so as to allow the water to run " down along, and the air of passing through them, thereby " causing an evaporation of the water and a consequent cooling " of the air. If necessary, the water may be lifted at the required " height by a small force pump, and, if required, carried by means " of a hose or other suitable pipes to any part of the train, and " these cause to run down along the said pervious bodies and " spread over the line; suitable water reservoirs are to be situated " along the line for providing the trains with the required quan-" tities of water.

" Instead of making use of water only, the same may have " mixed with it a suitable quantity of chloride of calcium, or any " salt having a great attraction of water."

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 7.—N° 1276.

SCOTSON, Edmund, and CHARNLEY, Henry.—(*Provisional protection only.*)—" Improvements in machinery connected " with traction and other engines, and in endless railways to be " used therewith."

" To enable the direction of the revolution of the wheels to be " reversed without stopping or reversing the engine itself, and to " cause one wheel to turn in one direction whilst the other wheel " turns in the opposite direction, so as to turn the engine or " machine in a very small space. This is effected by mounting " each wheel fast upon a separate and independent axle and " connecting such axle to the main shaft of the engine by fast " and loose spur wheels and a clutch box in such a way that when " the clutch box is thrown into gear with one spur wheel the " axle is turned in one direction, and when thrown into gear with " the other will turn the axle in the reverse direction, and if the " clutch box is thrown out of gear altogether, the engine may " work without producing any effect upon the axles or wheels."

And in an "arrangement of mechanism forming an improved " endless railway to be used in connection with such engines. " Around the outer periphery of the locomotive wheel is formed a " groove, in which an endless chain is placed, such chain being " loose on the wheel and carried round with the wheel by means " of studs attached to the wheel, and taking into the links, or the " chain may be made fast to the wheel. This chain at intervals " is furnished with flat V-shaped studs projecting outwards."

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 21.—N° 1392.

ANDERSON, Sir James Caleb. — " Improvements in loco- " motion, parts of which are applicable for other purposes."

In making a permanent way for locomotives to work on a good firm pitching of large stones having their broadsides downwards, the chinks to be filled in with chips of stone strongly driven home, and concreted to form a solid and smooth foundation to receive the upper surface of cut stone blocks, or stone or wood pavement, or well baked bricks, or small broken stones well cemented together, or timber plated with flat iron furnished with any of the *above* materials procurable in the district through which a railway may pass the compound tramroad is formed of the requisite breadth for the wheels of the locomotives and other carriages to run on. Equidistant is fixed between this compound railway a T rail of iron or timber, and to each locomotive engine or other carriage I attach two pair of horizontal wheels, two wheels to run on each side of the guide rail and under its horizontal top; by this arrangement a train can be guided round curves, and cannot run off the line.

To contract the gravity of a train on steep hills there is fixed a another T guide rail at the side of the compound tramway or common road to guide a small carriage which is to be loaded with a weight sufficient to overcome the gravity of the ascending train.

[Expired 3rd year. Printed, 6*d*. No Drawings.]

A.D. 1858, July 9.—N° 1548.

SANG, Frederick, and RAMMELL, Thomas Webster.—" Improvements in the means of conveying letters and parcels " from one place to another."

" The letters or parcels are placed in carriages to travel within " tubes, and will be propelled in the desired direction by atmo- " spheric pressure."

" And in the division of a main line of communication into " separate sections of convenient lengths, with stations at their " points of junction, and arrangements for the interchange of the " carriages, so that they may be passed from one section to " another, whereby a continuous and simultaneous up-and-down " communication may be maintained throughout the whole line, " and also the putting in and taking out of letters or parcels be " effected at each station with every train. Branch or cross lines, " also divided into sections, if requisite, may be made to commu- " nicate with a main line at any station."

[Expired 3rd year. Printed, 4*d*. No Drawings.]

A.D. 1858, July 20.—N° 1631.

SCHMITT, Jean.—(*Provisional protection only.*)—" Cementing, " hardening, and tempering rails for railways, and also axles for " railway carriage wheels."

" By which they are rendered much more durable than the " ordinary iron rails and axles; and for this purpose the rails

" and axles after being manufactured are submitted each of them " in a special furnace to the action of the following composition, " wholly or in part according to the kind of rails and axles " required, viz., charcoal, grease, hoof parings, tartar, coarse " sugar, rosin, saltpetre, and sand. The tempering must take " place after the cementation and hardening is made."

[Printed, 4*d*. No Drawings.]

A.D. 1858, August 2.—N° 1752.

GREAVES, HUGH.—" Improvements in constructing streets, " roads, and ways, thereby facilitating traffic and providing for " the more convenient conveyance of sewage, drainage, gas and " water supplies and telegraphic wires along the same."

" The foot pavements are formed higher than the road, of open- " work plates or grids of cast iron, supported in such manner as " to leave a space beneath, along which the pipes for conveying " the gas and water supplies may be conveniently laid, and which " will receive the mud, &c., which may fall through the openings " from the upper surface of the pavement.

" The curb, is constructed in the form of a hollow channel or " pipe, having openings along its sides to admit the surface water " from the roadway and foot pavement, and communicating at " short intervals with tanks sunk to a lower level for the purpose " of receiving the more solid matters which may be carried off with " the water. The pipe or channel curb may, in some cases, be " formed with one edge rail of a tramway attached thereto, the " other rail of which may be laid in the roadway, and also formed " as a pipe."

" By these arrangements the surface water may be kept com- " paratively pure, and conveyed apart from the sewage of dwelling " houses, &c., which is run into suitable tanks and from thence " pumped up into pipes, supported on columns along the road. " This pipe or pipes being made to carry a railway."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1858, August 6.—N° 1794.

CAREY, STEPHEN.—" An improved system of forming the per- " manent way of railroad transit, also common tramway and " channel or watercourse, by the means of cast-iron plates or

" boxes peculiarly constructed, so as to make one continuous way
" or channel."

The plates or boxes are put together side by side, or end to end as may be most convenient, to make a channel at the sides of streets or other roadways; the said plates are made to joggle or rebate together at their ends or sides, so as to make the plates combine together to form one plate or channel. The plates may be used in constructing the permanent way for railways; in that case they would have cast on their upper surfaces flanches to receive the rail, which would be so constructed as to receive a cast-iron rail made in a **T** form, with the lower part roached or curved to act upon a spring of steel, india-rubber, or wood. The two continuous lines of plates to receive the rail would be attached together by the means of cast-iron or sheet-iron plates, instead of transverse sleepers. The object of covering plates is to exclude the rain or wet, so as when laid there will be a much less liability of getting out of repair.

[Printed, 10*d*. Drawing.]

A.D. 1858, August 31.—N° 1971.

MENNONS, MARC ANTOINE FRANÇOIS.—(*A communication.*)—
" Improvements in the supports for railways."

" In an improved arrangement of metallic rail supports, the
" main feature of which is the obviation of direct contact in their
" separate parts by the interposition of compressible semi-elastic
" matters, the result of which is an increase of solidity and a
" reduction of the wear and tear which necessarily arises from the
" direct action of the unprotected metallic surfaces."

[Printed, 6*d*. Drawing.]

A.D. 1858, September 14.—N° 2089.

COCHRANE, HONBLE. WILLIAM ERSKINE.—"An improve-
" ment in the fastenings of railways."

" In the introduction of pins or rods of a hard material, which
" will not shrink transversely through the wood fastenings, so
" that the ends of the pins may come flush with the sides of the
" wood fastenings. By this means, when a wood fastening is
" driven in between the cheek of a railway chair and a rail therein,
" the ends of the pins will come in contact with the inner surface

" of the wood and with the rail, and will notwithstanding the " shrinking of the wood still retain the rail or rails secure."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1858, October 5.—N° 2209.

MENELAUS, William.—"Improvements in machinery for " straightening rails and wrought-iron bars."

" The machinery consists of a block or standard carrying a " bell-crank lever, in which two or more rams or sets of rams " vertically, and of an angular bed in which the rail or bar to be " straightened or supported. The bar rests upon and is received " against two sets of bearings, each set being composed of two or " more blocks, three being preferred. The rams are so placed " with respect to the blocks as to work between them. At every " stroke of the lever the two sets of rams are brought into action, " and as fast as each portion of bar is straightened it is pushed " forward by the action of the machine or otherwise until its " whole surface has been acted upon."

[Printed, 10*d*. Drawings.]

A.D. 1858, October 13.—N° 2284.

BRABY, James, and BRABY, James, jun.—" Improvements " in wheels and wheeled carriages to be propelled by steam, horse, " or other power, and in apparatus for retarding the same."

This invention relates to a novel or improved mode of mounting wheel carriages, and of adapting thereto a portable railway which will admit of the carriage being propelled over rough uneven ground with facility. The carriage and the engine and gearing to propel it are mounted on a strong framing, which carries the running wheels and also guide wheels. The peripheries of the running wheels and guide wheels have grooves cut in them to fit on a rail or rib made on the inside of a large wheel or narrow drum, which is placed on both sides of the machine; or, if desired, the running wheels and also the large side wheels may be furnished with teeth, and made to gear into each other. These large side wheels or narrow drums, with the projecting rib or rail, or teeth on the inner side, will form a continuous line of rails for the running wheels of the carriage to run on.

The action of the carriage and its appendages is as follows:— Upon imparting motion to the engine so as to actuate the running wheels, or upon causing the same to move forward by the application of other power, the running wheels will have a tendency to run up the projecting rib on the inside of the large side wheels or drums, within which they are placed, and by so doing will cause the same to rotate, and thus lay down in advance of the running wheels a continuous line of rails for the running wheels to travel upon.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1858, October 29.—N° 2413.

KIRRAGE, William.—" An improved elastic combination of " materials impervious to atmospheric influences, as a substitute " for hard woods, metal, leather, or felting, and for other pur" poses."

The patentee says, " If the new compound is intended for " cushions under springs for railway carriages, or locomotives, or " for buffers to the same, or for cushions under springs for car" riages, gigs, or carts, or for cushions under heavy vehicles when " no other springs are used, or for cushions under iron chairs used " for supporting iron rails on railways, or for pumps, valves, hose, " or piping, or for soles of shoes, or for portmanteaus, or for " other purposes as a substitute for heavy leather, take sixteen " pounds of india-rubber, twenty-five pounds of tar, forty-eight " pounds of finely-powdered chalk, sixteen pounds of hemp, and " ten pounds of sulphur."

" These substances are to be formed into a compound moulded " and hardened as above described."

[Printed, 4*d*. No Drawing.]

A.D. 1858, November 1.—N° 2433.

CARISS, John. — " An improved safety switch box and " gear."

" In constructing a switch box, so that the lever is made to lay " in a horizontal position within the cover of the box, and " parallel to the line of rails, by which means accidents arising " from the levers standing up are prevented."

" The improved switch box is particularly applicable to goods' " yards and colliery railways, where horses are employed in " shunting, and also to railways or tramways around docks, as

" well as to all railway stations where passengers have to cross
" and travel."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1858, November 9.—N° 2504.

DICKSON, JOHN FARMERLY.—" Improvements in the con-
" struction of railway chairs and other details connected with the
" permanent way of railways."

" Firstly, an improved chair having that part upon which the
" rail rests extended, and also in constructing such chairs, so as
" to give an elastic bearing to the bottom of the rail."

" Secondly, of an improved adaptation of wrought instead of
" cast iron in the formation of railway chairs, whether such chairs
" form part of wrought-iron sleepers, or are used as ordinary
" chairs upon wood or other bearers."

" Thirdly, an improvement in ' fish joints,' wherein the bottom
" of the rail bears upon one of the wrought-iron ' fishes ' resting
" upon the chair on either side of the joint."

" Fourthly, supporting the rail between blocks of wood or
" metal, the lower surface of such rail not resting upon the chair
" or sleeper."

" Fifthly, an improvement in railway keys or wedges, formed
" of metal so as to receive a block or packing of wood or other
" elastic material. And in constructing the chairs so as to allow
" a packing of wood or other material to be inserted, in which case
" keys wholly of metal may be applied."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1858, November 9.—N° 2516.

ORDISH, ROWLAND MASON.—" Improvements in constructing
" the permanent ways of railways."

" Firstly, in holding and supporting rails by means of metallic
" sleepers, constructed somewhat in the form of hollow oblate
" spheroids, having their vertical considerably less than their
" horizontal diameter. The upper portion of the shell of each
" sleeper is partly cut away, so as to admit of the jaws formed
" thereon, being sprung slightly farther asunder, in order after
" the rail has been placed in position between them, to admit the
" introduction of a block, wedge, or key, between the rail and one
" or both of the jaws. The block is formed with projections,

" corresponding to indentations formed in the inside face of " the jaw, whereby, when it has once been placed in position " and the jaws, after being sprung in order to insert it, are " allowed to exert the pressure due to their elasticity, it is " securely held and cannot be removed until the jaws are again " sprung asunder for the purpose."

" Secondly, in constructing chairs intended for attachment to " sleepers, of such form as to be slightly elastic, and to permit " the jaws formed thereon to be sprung asunder, and by their re- " action to hold the rail either with or without the intervention of " blocks, wedges, or keys."

" And, thirdly, in securing the ends of two adjacent rails where " they abut or come together, by means of a metallic spring clip " forming a curve beneath the rail, and having its edges acting " upon plates situated upon each side of the web of the rail."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1858, November 11.—N° 2532.

BENSON, MARTIN.—(*A communication.*)—" An improved manu- " facture of rails for railways."

" In the manufacture of hollow railway bars, the sustaining " power of which, up to a given point, will increase in proportion " to the weight it is required to carry. In manufacturing the " improved rail, a set of three-grooved rollers is employed; these " are mounted one above the other in suitable framing, and " geared together in a manner similar to the method of working " three rollers for other purposes. The rollers are furnished with " a series of progressive grooves, suitable for bringing the bar " to the required shape, and by the arrangement of three rollers " the bar is passed through the rolls in one direction and " returned in the opposite direction with great expedition, so that " by one heating of the bar it is made available for the greatest " possible amount of rolling."

" The improved rail is of the T-form, but with a pear-shaped " hollow in the head, the walls or sides of the rail are concave on " their outer surface, and their inner faces are made parallel for a " certain height, and brought into contact, thus when the rail is " loaded the walls of the rail will have a tendency to press to- " gether, and make the rail as strong as if they were welded " together."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1858, November 16.—N° 2573.

SAMUEL, James.—" Improvements in sleepers or bearers for " rails."

In constructing the sleepers in a hollow semi-spherical, hexagonal, or other polygonal form, with a straight-sided or with angular-sided trough formed therein or thereon, in such manner that, by the aid of blocks or wedges of wood, or other like suitable elastic material placed at each side in the web of the rail, it may be supported clear of the bottom of the trough. The sleepers may be plain or corrugated, and are intended when laid to be packed or filled on the inside with ballast. They may be made of cast or wrought iron, and may be made by stamping or by any other approved method of manufacture.

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1858, November 16.—N° 2576.

JOHNSON, William Beckett, and SHEPHERD, Joseph. —(*Provisional protection only.*)—" Improvements in machinery or " apparatus for adjusting the permanent way of railways."

" In ballasting the rails, by the employment of apparatus upon " the lever principle, as distinguished from the ordinary method, " which consists in ramming the ballast; thus to an arm capable " of being hooked on to the sleeper or rail a lever is jointed, " which being caused to turn thereon forces the ballast forward. " A similar apparatus is employed for twisting the rails into their " correct position when displaced; the lower end of the lever " being in this case caused to bear against the rail."

[Printed, 4*d.* No Drawings.]

A.D. 1858, November 27.—N° 2701.

BURRELL, Charles.—" Improvements in traction engines " and carriages."

" In constructing the wheels which run on the portable rail- " ways, trough or double-angle iron is used in such manner that " there are two rows of iron spokes to each wheel, the outer end " of which are fixed to the iron ring, and there are openings or " spaces through the iron for the passage betweeen the two rows " of spokes of the **A**-formed bars or projections which connect " the shoes constituting the portable railway with the wheel, the

“ shoes being each formed with two parallel rails on their upper “ surfaces, on which the tyre of the wheel runs, the A-formed bar “ being fixed to the shoe between such parallel rails; and the “ guide irons for such projections are fixed to the trough or “ double-angle iron, so as to come on each side of the projections. “ In order more advantageously to gear the main or driving shaft “ with the driving wheels, pinions are affixed (one at each end of “ the driving shaft), which, when in action, gear into the cog “ wheels on the driving wheels of the carriage, and the boiler and “ engines are so carried by the axle of the driving wheels, that “ they may be raised or lowered thereon by means of screws and “ levers, by which means both or either of the pinions on the main “ driving shaft may be put in gear with the cog wheels of the “ driving wheels of the carriage, or both the pinions may be out “ of gear with their cog wheels, according as the end of the boiler “ is raised or lowered in respect to the main or driving shaft.”

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1858, November 30.—N° 2725.

LUIS, Jozé.—(*A communication from Leon Barroux.*)—(*Provisional protection only.*)—“ A new railroad, with continued supports “ splintered together without any wood.”

“ The direct support of the rail on the ballast in its whole “ length, and to give it the necessary stability, by adding to the “ base an auxiliary surface to obtain the same size of surface for “ support as in the road having cross beams. This surface is “ not manufactured with the rail, but at the time of placing the “ rails it is bound with it by means of hooks and bolts of iron, “ which permit of an easy dismounting and replacing. The “ arrangement of the system of the fastenings of the rail on its “ auxiliary base is such that the trepidation of the road and the “ jolts that it receives are quite powerless in producing the least “ slackness or looseness.”

[Printed, 4*d*. No Drawings.]

A.D. 1858, December 1.—N° 2736.

BOW, Robert Henry.—“ Improvements in railway chairs and “ fastenings.”

“ An arrangement of railway chair wherein the rail is held by

" three fixed resisting surfaces, the retaining pressure upon which " is brought into play by a fourth pressure, arising from the " action of a binding wedge or key, or by a screw or other " fastener."

" These three pressures are brought into action by the pressure " of a key fitting into and pressing against a corresponding con- " cavity in the interior of the higher jaw of the chair on one " side, and on the other against the outer side of the rail at the " point where the lower side of the web joins the bottom flange."

" In the chairs the inner jaw is only about half the height of " the outer one, and the latter is formed with a shallow concavity " running horizontally along its central portion. The inner end " of the screw bears against the rail through the medium of a " spring, which may be variously placed for the purpose of se- " curing an elastic holding action."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1858, December 8.—N° 2817.

WESTMACOTT, CHARLES MARTIN.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

" For the purpose of fixing fish plates to rails, rails to chairs " and sleepers, or chairs to sleepers, screw bolts are employed " having heads at one end and right and left-handed screws cut " on the other. The screw thread which is furthest from the " head is formed on a part of the bolt which is smaller in diameter " than the part on which the other thread is cut; these screw " threads receive nuts which are screwed on in opposite directions, " and of which one serves to lock the other, or the screw nearest " the head is arranged to screw into a hole tapped in the fish plate " or rail, or other part to be secured."

" In the construction of permanent ways in which transverse " sleepers and chairs are employed, cushions are placed exterior of " the chair and on each side of it, so that the under side of the " rail may rest on these cushions; in this manner a longer bearing " surface is provided for the rail than when it is supported by the " chair only, and in arranging the chairs for supporting the rails, " in place of forming them with two fixed jaws with sufficient " space between them to receive both the rail and a wooden key, " the end of one of the jaws is made a detached piece which " drops in between the rail and the other part of the jaw, and is

" secured by a bolt passing through it and through the bottom of " the chair, and is of such a form as when in place to hold the rail " without the use of a key. In some cases cushions of wood are " employed between the parts of the chair and the rail."

[Printed, 4*d*. No Drawings.]

A.D. 1858, December 17.—N° 2893.

JOHNSON, William Beckett.—" Improvements in machinery or apparatus for preparing for joining the rails of railways."

" Firstly, a method of cutting so as to obtain correct lengths. " For this purpose a portable apparatus is employed, which may " be transported to any part of the line, and constructed with a " cutting tool caused to reciprocate by an excentric or other such " apparatus, and the traverse is gained for the cut by suspending " the tool upon a centre, on which it is caused to swing."

" Secondly, apparatus for making 'fish joints,' or other joints " of similar requirements, and consists in combining the above " cutting apparatus with a drill or drills, so that the two operations of cutting to length and drilling the holes may proceed " simultaneously. And as applied to making the said 'fish " 'joints' in using a combination of two or more drills without " the cutting tool, so that the like number of holes may be drilled " at the same time."

[Expired 3rd year. Printed, 1*s*. 2*d*. Drawings.]

A.D. 1858, December 24.—N° 2950.

JOHNSON, John Henry.—(*A communication from Christian E. Detmold.*)—" Improvements in the permanent way of railways."

" An improved mode of joining and fastening the ends of the " rails, whereby the rail ends are kept in the same vertical and " horizontal planes without any other description of fastening, " the rails being also left entirely free to expand and contract.

" It is proposed to cut notches in the webs of the rails, at their " ends, and to insert into them iron joint pieces of such a section " as to enable them to fit accurately into the slots, and at the same " time to fit against the sides or under the head of the rail."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1858, December 30.—N° 2986.

HEYNE, John Francis Colfs.—(*Provisional protection only.*) —" Improvements in railway chairs and rails, and in the mode of " fixing the same."

" In shaping longitudinally the inner surface of the rails so as " to present a transverse curvilinear concavity to the back of the " chair, which is shaped in similar manner, whilst the outer " surface of the rail is provided with suitable key plates fitting " closely within the ordinary channel or groove of the same, and " the whole secured together through the medium of bolts and " nuts, by which arrangement the rails, on being worn out and " flattened at the upper face, may be taken out and reversed, a " key way and key being employed in connection with the seat of " the chair for tightening or wedging the rail, when required, " together with a double surface chair, and tightening bolts at " the joint or juncture of the rails."

[Printed, 4*d*. No Drawings.]

A.D. 1858, December 31.—N° 2998.

JOHNSON, John Henry. — (*A communication.*)—" Improvements in the permanent way of railways."

" In the application and use of fish plates or bars, which hold " the rails at their base and by their lower rib or flange in place of " holding them by the web. These ' under fishes ' make use of " the lower part of the rails for the purpose of consolidating their " union. And the perforating of the rails for the passage there- " through of fish bolts is entirely obviated. For the ordinary " double-headed rail the fish is made in the form of two grooved " jaws which fit on to opposite sides of the lower flange of the " rail, and are held together by transverse bolts underneath the " rail, and are bolted or pinned down on to the sleepers. These " fishes may also be used in combination with a cast-iron chair " bolted to the sleeper."

" When a trough rail is used, the fishes are bolted down on to " a separate sole or base plate, and their edges protrude over the " expanded flange of the rail, and in some cases a strengthening " rail may be formed longitudinally along the under side of the " sole or base plate. This plate may be applied in combination " with the fishes to the bridge rail and to the ordinary flange rail, ' suitable projections being made on the upper surface thereof for

" the fish plates to rest upon. Lugs may be formed, if necessary, " upon the sole plates for the purpose of pinning them down to " wooden sleepers, when sleepers are employed, but in many " cases this system of support will enable the rails to be laid " directly upon the ballast, thus forming an entire metal way."

[Expired 3rd year. Printed, 10*d.* Drawing.]

1859.

A.D. 1859, January 5.—N° 42.

CORFIELD, William.—" Improvements in chains for coupling, " cranes, cables, mining purposes, hoisting, and all other purposes " where chains are used."

" To prevent accidents happening from the chain breaking, " instead of making chains of single links, it is proposed to form " them in double links, one set being a little longer than the " other, so that when any strain is applied the short links only " receive it; but should any of the short links break or snap, " either from wear or flaw in the manufacture, the longer links " then take the strain."

[Printed, 4*d.* No Drawings.]

A.D. 1859, January 13.—N° 112.

BANKS, Daniel Lancaster.—" A method of constructing a " travelling suspension rail or roadway, applicable, among other " uses, to a bridge and lifting agent."

The patentee says, " My invention consists in laying down two " rails or sets of rails, between which the suspension railway is " to be constructed and used. I mount stout frames upon " wheels, and set one upon each set of rails. The frames carry " the uprights, which are to act as buttresses, between which the " suspension chains are to be carried. In order to give stability " to and maintain the buttresses in their upright position, I carry " bars downwards from the frame, and mount rollers or wheels " horizontally or diagonally on the lower ends thereof, which " wheels run against the ground or masonry beneath the surface " of the earth or level of the rails, and are prevented from rising " by a projecting flange or block fixed beneath and parallel to the " rails. The frame is weighted, and, if found necessary, counter-

"balance and weighted levers are run out laterally from the "buttresses in order further to give support and steadiness to "them. The suspension chains or rods carry upright rods, wires, "chains, or bars, to which a roadway way extending from "buttress to buttress, and from one set of rails to the other, is "attached."

"Where required, I provide means for causing my suspension "railway to travel along a set of rails laid at right angles or "diagonally to one of the sets of rails. In such case temporary "supports will become necessary, and by the adaptation of chains, "ropes, and windlasses, the suspended way may be used for "raising or lifting weights."

"Again, should the way not be strong enough to support any "carriage or article passing over it, support may be given to the "same from below."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, January 14.—N° 127.

ROMAINE, Robert.—"An improved arrangement of portable "railway."

"By this invention the rapid destruction of the ends of the "rails, and the indenting of the ground with the ends of the "sleepers are avoided, and smooth and even working ensured. "In order to attain this result distinct series or rails and sleepers "are caused alternately to come into use, and sustain the pressure "of the carrying wheels. This may be done by mounting two "or more pairs of carrying wheels on the same axle, and applying "sets of rails to the periphery of each wheel in such a manner as "to ensure the placing on the ground of a rail of one set for its "wheels to bear upon before the pressure of the adjacent wheel is "taken from its railway. Or the like effect may be obtained by "applying to one and the same wheel two sections or parts of a "portable railway, the periphery of the wheel being made pro-"portionately broad for this purpose, and slotted to provide for "the attachment of the sleepers."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, January 15.—N° 131.

BANKS, Daniel Lancaster.—"Improvements in the method "of constructing a travelling suspension rail or roadway to be "used for the cultivation of land."

Improvements on the Patent, 1859, Nº 112.

The patentee says, "Instead of having the rail or roadway to "extend form one set of rails to the other, I have an opening left "between the one set of rails and the other, so that an apparatus "projecting from the carriage may traverse between the two sets "of rails, or be suspended beneath them. I also provide means "for lengthening or shortening the upright suspension rods, so "as to accommodate the suspension rail or roadway to the "undulations of the ground, for instance, by having the upright "suspension rods constructed with sliding joints, or by other "mechanical means."

"And instead of two lines of suspension rods, and upright rods "and rails, I use only one, or more than two lines of suspension "rods with the necessary upright rods and rails."

"The carriage travelling along the railroad I actuate by means "of shafts passing from buttress to buttress, carrying a wheel or "wheels which drive other wheels, which work into a rack "attached to the rail or roadway, or by an independent stationary "engine, or by the engine or engines connected with and intended "for moving the buttress or buttresses."

[Expired 3rd year. Printed, 1*s*. 4*d*. Drawings.]

A.D. 1859, January 19.—Nº 161.

CLARKE, THOMAS.—"Improvements in the manufacture of "core barrels for pipes or columns, used either for railway piles "or columns, or for water pipes or sewerage pipes."

"Heretofore core barrels have been constructed with one row "of hinges only and a loose key or slide, which key or slide has "had to be removed every time a fresh casting is produced, "whereas according to the present invention a core barrel is constructed with two rows of hinges and without a slide or key, "but with three stay bars, which when loosened allow the core "bar to leave the casting without impediment, thereby effecting "considerable saving of labor, time, and expense."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, January 22.—Nº 203.

DORSETT, EDWARD, and BLYTHE, JOHN BENNINGTON.—"Improvements in the distillation of oil from coal tar, and in "apparatus for preserving timber therewith."

The patentee says "For preserving railway sleepers and other

" timber with tar, oil, sulphate of copper or other preservative, we " employ an open tank mounted on a suitable wheel carriage, and " divided into compartments by partitions furnished with the " necessary heating apparatus, and having pipes, which form " junctions with a vacuum cylinder or closed compartment " of the tank which can be closed at pleasure; the ends of the " said pipes are supplied with perforated plates and washers " according to the size of the timber to be preserved, and at the " other end of each compartment are suitable appliances for " pressing the sleepers or timber against the perforated plates. " Having placed the sleepers or timber so attached in one com" partment of the tank, we cover it with creosote or other " preservative fluid, and apply heat thereto, and having obtained " a partial vacuum in the cylinder, we open the connection with " the sleepers through the pipes, and the heated liquid in the " tank is drawn through the sleepers into the cylinder."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1859, January 22.—N° 206.

RAMMELL, THOMAS WEBSTER. — " Improvements in atmo" spheric propulsion, and the structures, tubes, machinery, and " apparatus applicable thereto."

Relates more particularly to the structures upon which the carriages are to run, which are to be of iron, and so arranged that they might conveniently be erected in towns along the central lines of wide streets and thoroughfares. One line of railway is placed above the other, and both are supported upon a single row of columns, the upper line resting immediately upon arched ribs springing from the tops of the columns. Wrought-iron girders span the space between the columns, each pair containing and supporting between it the rails and tube constituting a complete line of way.

Also to an arrangement of the termini of such railway, in such manner that a portion of the line at each terminus, with a train of carriages upon it, may be raised or lowered bodily between the limits of the upper and lower lines, so that the trains of carriages arriving at one end of such railway may be raised vertically from the level of the lower line to the level of the upper, or vice versâ.

Also, to the propulsion tube having in it a longitudinal groove *or grooves,* and to the use at the stations of any atmospheric railway of a continuous propulsion tube containing valves so placed that a separate chamber is formed, in which the travelling piston may be received and brought to rest, and from which it may be again started.

Also, to the construction of the longitudinal valve of the propulsion tube, which valve is to have a parallel slide movement, and that of the apparatus for opening and closing such valve.

[Printed, 1*s*. Drawings.]

A.D. 1859, January 24.—N° 219.

CAITHNESS, Earl of.—(*Provisional protection only.*)—" Im-" provements in parts of the permanent way of railways."

" In making a portion of one or both the rails at the ' joints ' or " change of line, slide along inclined parallel slots, the two ends " of such sliding rails, and the ends of the stationary abutting " rails being bevelled to correspond to the level of the slots, " whereby an overlap level joint is obviated. The pointed swivel " switch rail remains unaltered; but the rail end is bevelled in " place of being cut square off. To this latter rail is fitted a " slide, which is connected with that portion of the rail which " works in parallel slots, so that on the slide being moved by the " lever which opens or closes the switch, it carries with it the " loose rail, and causes it to travel in its parallel inclined slots, " and change the points accordingly."

[Printed, 4*d*. No Drawings.]

A.D. 1859, February 8.—N° 356.

REDMAN, John Baldry. — " An improvement in the con-" struction of carriage ways."

" In forming the wheel ways of metal, while the space between " may be filled with paving. The whole street is so paved and " the carriage way so constructed as to allow of horses, carriages, " and wagons, passing over every part, though the wheels only " should travel on the metal. The surface of the iron upon which " the wheels are to travel is formed, with a diamond or other like " raised pattern. This surface is the upper part of a trough, laid " down upon concrete or other like material, and each trough is " bolted and secured to the next, in such manner as to allow for " expansion and contraction, while at the same time the fastening

" admits of ready removal, in order to take up any one as occasion " may require."

[Printed, 10*d*. Drawing.]

A.D. 1859, February 10.—N° 376.

COVERT, WILLIAM ADOLPHE.—(*A communication from Charles L. Spencer.*)—" An improved self-acting railway switch."

" In switches so arranged that the engine driver or guard shall " have full control over the points whilst the train is at full speed. " The two outer rails, and the inner rails or points are fixed, and " the change of direction is effected by two guide rails or " ' switches ' connected together by a tie, and turn upon pins " at one end. Outside the fixed rails are two moveable rails " connected together by a cross bar, and furnished with inclined " planes. The cross bar is provided at or near its centre with a " projection, which acts upon the tie connecting the switches. " The engine and tender, and the last carriage of each train are to " be provided with two small rollers capable of being raised up or " lowered by the driver or guard, and so connected together that " the depressing of the roller on one side shall cause the raising " of that on the other side. If the engineer desires the train to " run off on to a siding at the right hand, before reaching the " points he depresses the right hand roller. As the engine " approaches the points, this roller coming against the inclined " plane will thrust the moveable rail on that side, and by means of " the cross bar draws the switches into the required position. " The projection on the cross bar gears into a peculiar form of " locking cam, consisting of a circular plate provided with a " notch and two projecting fingers or catches, and capable of " turning on a pin on the tie connecting the switches, which pre- " vents the switches from being moved by any other agency than " the action of the moveable rails."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1859, February 14.—N° 412.

CLARK, JOSIAH LATIMER.—" Improvements in the means of " working railway signals and switches."

" In arranging at or near the foot of the signal post or switch " two hydraulic cylinders, each furnished with a pipe leading to " the place from whence the signal or switch is to be actuated,

" and at this place is a force pump by means of which water may " be forced into one or other of the cylinders, and they are also " connected together in such a manner that when the piston or " plunger is forced forward by water being injected into the " cylinder, the plunger or piston of the other cylinder is pushed " back to its orginal position, and the water which the cylinder " contained is caused to flow back by the pipe to the place where " the force pump is situated, and there it is caused to flow into a " measuring vessel, so that the person working the force pump " may know by the quantity of water returned by the pipe when " the required amount of motion has been produced."

[Printed, 1*s*. Drawings.]

A.D. 1859, February 22.—N° 483.

CLARK, William Stettinius. — (*A communication from Sidney A. Beers.*) — (*Provisional protection only.*) — "Improvements in the formation of cast-iron rails for city railways, and " also in the method of uniting the ends of two adjacent rails " for railway use."

" The construction of an upright self-sustaining rail of cast " iron, with car and carriage back combined, and secured and " united at the joints by an upright iron splice wedge, and also " the application of the splice wedge to any kind of rail by the " addition of cleets, either in parallel lines to receive and hold the " compound wedge, or by converging lines of cleets at and adjoining the ends of the rail to receive and hold the single wedge " separately and combined."

[Printed, 6*d*. Drawing.]

A.D. 1859, February 23.—N° 497.

TURNBULL, George.—" Improvements in the permanent way " of railways."

" In constructing the railway, longitudinal sleepers of iron are " used, and the rails are fixed thereto by screw bolts and nuts. " The horizontal upper surface of the sleepers is made of a " greater width than the widest part of the lower surface of the " rails to be fixed thereon, and the upper surface of the sleepers is " formed with a longitudinal groove or recess only slightly wider " than the under surface of the rails, to prevent their moving " laterally. The whole width of the sleepers is formed flat, so

" that it rests horizontally on the surface of the earth below. In " order to preserve the gauge of the sleepers and rails, transverse " ties are fixed at intervals under the longitudinal sleepers or " bearers by screw bolts and nuts; these ties are flat at their " upper surfaces, and they are turned down at right angles at " their edges. The flanches or turned-down edges of the longitudinal sleepers or bearers are cut away where the ends of the " transverse ties come under the sleepers or bearers."

[Printed, 1s. 4d. Drawings.]

A.D. 1859, February 24.—N° 507.

PRICE, Enock, and HAWKINS, Edmund.—" Improvements " in the mode of forming fish plates, and in the mode of fixing " or attaching them to the joints of rails on railways."

" First, in forming the fish plates in such a way that either side " of the plate may be placed against the side of the rail, and each " plate may be used on either side of the rail, by forming each " fish plate identically similar to each other, and also that the " outline of each shall be symmetrical about a mesial plane, passing " either longitudinally or transversely through it; thus, supposing " a plane to pass through the axis longitudinally, the outline of " the fish plate on the right of the plane would be exactly similar " to that on the left; this outline will vary slightly to suit the " different kinds of rails to which the fish plates are applied. " And to keep them fixed to the rails, the bolt is made square, " with a thread on the end for the nut, and the holes in the fish " plates are rectangular. By this arrangement it becomes impossible for the bolt to turn or oscillate when put through the fish " plates, nor can it get loose when properly tightened."

[Expired 3rd year. Printed, 8d. Drawing.]

A.D. 1859, March 7.—N° 591.

CABANY, Armand.—(*Provisional protection only.*)—" A new " system of quoins (wedges) for railways."

" To substitute for the ordinary quoin or wedge used to maintain railway chairs and rails in position, one which is termed a " double or twin wedge so arranged that the parts shall (as it were) " dovetail the traction and lateral jerks of the rolling stock at " speed, serving more accurately to fix the combination of rail, " wedge, and chair together than to loosen the adhesion."

" On single lines of rail these wedges should be placed alter-
" nately one way and the other, but on double lines of rail, where
" the traction is always (or nearly so) in one direction, the sharp
" end of the wedge in contact with the rail should be in the sense
" of the traction."

[Printed, *4d.* No Drawings.]

A.D. 1859, March 7.—N° 596.

AIMONT, Pierre Ernest.—" Improvements in the construc-
" tion of waggons and other carriages for railways and ordinary
" roads, and of apparatus connected therewith."

" First, in constructing carriages in such manner that, should
" the wheels of the same pass over inclined or irregular ground,
" or round a curve, the body of the carriage will nevertheless
" continue vertical."

" Secondly, in forming rails with an upright tongue, and with
" the bottom sloping upward from the middle towards both sides,
" so that wedges may be conveniently placed under the rails as
" may be required to support them and keep them upright. The
" successive lengths of rail are jointed together by links, which
" allow of their conforming themselves to curves and irregularities
" of the ground, and both rails and wedges are bolted down by
" suitable spikes."

" Thirdly, in forming an instrument with a weight to indicate
" the middle of the track, and with upright arms and transverse
" bars so combined as to determine the gauge of the way as the
" rails are laid down."

[Expired 3rd year. Printed, *8d.* Drawing.]

A.D. 1859, March 15.—N° 649.

LANGTON, Walter.—" Improvements in the manufacture of
" keys and wood fastenings used in constructing railways."

" For these purposes the keys and wood fastenings are com-
" pressed and charred by forcing them through a highly heated
" die formed internally to the section of the desired fastening;
" pieces of wood of larger dimensions than the die are in suc-
" cession forced through it, by which they will become compressed
" and charred. When wood fastenings are desired to be larger at
" one end than the other, it is preferred to force the pieces of

" wood into a properly shaped and highly heated die, and then " to force the charred fastenings back out of the die, or the dies " may be made in parts, and the parts made capable of move- " ment."

[Printed, 4*d*. No Drawings.]

A.D. 1859, March 16.—N° 665.

DENYS, Joseph Michel.—"Certain improvements in the " construction of railway crossings."

" In the employment of a cast-iron table or plate having lugs " cast thereupon, by means of which it may be bolted to the " ordinary wooden sleepers. Upon the top of this are three " wrought iron or steel crossing pieces, their upper faces being " formed similar to the ordinary rail, but are made tapering or " conical at their lower extremity. These three crossing pieces " are securely held in their places by means of wrought iron or " steel plates fixed between them, and formed tapering or dove- " tailed at the edges, and secured by bolts to the top of the cast- " iron table."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1859, March 21.—N° 707.

HAGGETT, William.—" An improved method of treating " metals and other materials to increase their strength."

" In giving to iron and other metals, by rolling, pressing, or " casting, an undulated surface, composed of longitudinal and " transverse corrugations crossing each other at right angles, or " diagonally at other angles and also in giving a similar surface to " all other materials capable of being pressed and moulded, whereby " an ornamental surface is produced, and the strength of all such " metals and other materials is increased, rendering them more " suitable for many architectural and mechanical purposes."

[Printed, 6*d*. Drawing.]

A.D. 1859, March 22.—N° 727.

BANKS, Daniel Lancaster.—"Improvements in suspension " rail or roadways, and in machinery or apparatus connected " therewith."

" In laying down at any desired distance apart two or more

" rails or other manufactured ways. Upon these ways are placed " across from way to way at any desired distance apart two travelling suspension ways constructed in the manner described in " the Patent A.D. 1859, N° 131; again, upon these frames are " set on wheels or carriages which serve to act as buttresses, and " between these carriages or buttresses a suspension rail or roadway is constructed. Upon the travelling or suspension railways " are placed carriages to which are attached implements or machines to be used for the cultivation of the land."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, March 23.—N° 740.

BROWN, BENJAMIN.—(*A communication from Victor Armand Prou.*)—"A new method of working or operating switches and " signals on railways by improved apparatus for that purpose."

" In working switches and disc signals by causing the flanges " of the running wheels of the carriages and levers connected to " the engine to actuate mechanism fixed at certain parts of a railway, consisting of a hydro-pneumatic swing table, connected " with which are pumps in which oil is placed, and oils of a non-siccative character, or not capable of congealing in cold weather " being used. The pistons of the pumps are worked either by " exhausting air therefrom, or by compressing the oil therein, or " both. Two handles or levers are connected to the engine, which " are operated upon by the switches, and sound the whistle of the " engine when the train arrives at a station. And connecting the " switches to or with the aforesaid pumps by means of rods and " chains so as to raise the piston of one pump, thereby causing " the other to descend. The pistons are operated upon by the " wheels of the locomotive as they pass over chains working on " pullies placed in the line of railway, and said pumps are connected by rods and chains to the disc signals and switches " respectively, so that according to the direction in which the " train is going, in like manner the disc signals and switches will " be properly operated upon for the next or succeeding train."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, March 25.—N° 759.

HILL, CHRISTOPHER. — (*Provisional protection only.*) — "Improvements in the permanent way of railways."

" For this purpose when supporting the rails of railways by " means of side bearing plates, having flanges on one or both of " their sides, which are fixed to the rail, the rail is formed with a " web, which projects downwards below the bearing plates, " strengthening the rail itself, and preventing it and the bearing " plates from moving sideways, and the lower end of this web may " be formed with a flange on each side."

" When using bridge or trough rails, with wrought-iron bearing " plates, the flanges are placed on the sides of the bearing plates, " within the hollow of the rail and between the two flanges of the " side bearing plates. The flanges of the plates and the head of " the web exactly fit within the hollow of the rail, and are held " together by bolts."

[Printed, 4*d*. No Drawings.]

A.D. 1859, March 26.—N° 768.

MUIR, Matthew Andrew, and McILWHAM, James.—" Improvements in moulding or shaping metals."

The patentee says:—" These improvements have been specially " contrived for moulding railway chairs and other articles. In " some cases it may be found convenient to adopt a mechanical " arrangement for re-conveying the pattern plate and pattern to " the heating box instead of accomplishing this by hand. For this " purpose there is hinged on to the front of the drawing platform " a weighted tumbling lever pedestal to support the central portion " of the pattern plate when the latter is turned over after the " 'draw.' When the moulder with his assistant turns the plate, he " with one hand turns up the lever pedestal to the position necessary " to give support to the overhanging portion of the plate, and " in this condition it is ready for being slung back again to the " heating box by the traversing sling, trunnions or catches being " provided on the pattern plate for the purpose. When the " plate has thus traversed away, the lever support falls down of " itself out of the way."

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1859, March 29.—N° 788.

BURT, Henry Potter. — " Improvements in apparatus for " preparing and preserving timber."

In apparatus for impregnating railway sleepers and other timber with creosote or other preservative liquids, and with solutions for colouring the wood, or for rendering it incombustible, a strong metallic cylinder is employed with an air pump for exhausting the air, and a force pump for forcing in the liquid.

The sleepers are packed on carriages, which are pushed into the cylinder, and the end of the cylinder is then put on and secured. The air is then exhausted by the air pump. The air within the pores of the wood expands and drives out the water and sap contained in it, which runs through a valve into a vessel at the bottom of the cylinder. The creosote is then admitted and pumped in until a considerable pressure per square inch is produced, which forces the liquid into the wood. The liquid is then drawn off, and the end of the cylinder is removed, and the carriages with the timber drawn out and unpacked.

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, March 30.—N° 793.

EDWARDS, William Vaughan. — (*Provisional protection only.*)—" Improvements in the construction of ways and apparatus " to facilitate the conveyance of mails, goods, and passengers."

" For these purposes an enclosed passage is constructed be- " tween distant places, with arrangements for stopping at the " stations to deliver and take mails, goods, and passengers. " At the lower part of such enclosed way two parallel rails are " formed in longitudinal grooves or recesses. The carriages have " each four wheels, two before and two behind. The body of the " carriage is supported by suitable projections at the fore and " hinder parts, and such projections receive the bearings or brasses " of the axles which are applied at their ends. Each wheel is " fixed to a short axle, the inner end of which is received into and " is supported by a central bearing, so that the wheels may run " independently of each other, which will facilitate the passage of " the carriage round curves.

" The interior of each carriage is to be arranged according to " the purpose for which it is to be used, whether for the carriage " of mails, or goods, or passengers."

[Printed, 4*d*. No Drawings.]

A.D. 1859, April 14.—N° 938.

BEATTIE, Joseph. — " Improvements in the means of pre-" venting locomotive engines and carriages in motion on railways " leaving or running off the rails."

The patentee says,—" Locomotive engines and carriages are " caused to run off the rails from two causes, videlicet, from the " irregular action of the wheels occurring after the breaking of the " axle of one or more of such wheels, and during or soon after the " descent of an incline.

" My invention, therefore, is to prevent such results, by having " a suitably formed ring of metal, cast on or affixed to the " inside of the boss of each wheel, with a lip or turned-down " edge, and I have on the axle of each wheel a ring of metal with " a turned-up edge, so placed that it will come between the " turned down edge and the boss of the wheel, so that if the axle " break between such turned-up edge and the boss, the edges " will preserve it in a horizontal position or nearly so, and pre-" serve the carriages on the rails. And in having in some cases " an additional or check rail parallel with the ordinary rails at " convenient positions on inclines or curves, and I fix such check " rail in a groove in the chairs, or by other suitable means, and " firmly secure it to the ordinary chair, rail, or sleeper."

[Printed, 10*d*. Drawing.]

A.D. 1859, April 25.—N° 1034.

BUCKHAM, Thomas. — (*Provisional protection only.*) — " An " improvement in railway switches."

" In connecting the moveable switch rail to the fixed head rail " by a hinge joint 'fished' to each side of the ends of the switch " rail and head rail. One of the hinge joints acting as the centre " on which the switch rail moves, whilst the other has the hole in " which the pin fits, made oval or slotted about one-eighth of an " inch in the direction in which the rail moves, in order to allow " of the required movement of the switch rail."

[Printed, 4*d*. No Drawings.]

A.D. 1859, April 25.—N° 1040.

WARNE, William, FANSHAWE, John Americus, JACQUES, James Archibald, and GALPIN, Thomas.—

"Improved compounds, applicable for packing the joints of "steam or other pipes, which compounds are also applicable "for packing or lining parts of machinery in general, or parts of "ships, bridges, tanks, or railways."

"In combining together certain materials to produce a com-"pound which will be able to resist any degree of heat to which "it is liable to be exposed in use, the materials employed are "caoutchouc, or india-rubber, gutta percha, or other elastic or "flexible gums, bituminous, resinous, or gelatinous substances, "or any or all of these, either alone or in combination, to which "must be added iron, steel, or other metal filings or borings, or "ores of iron or other metals or oxide of iron, or manganese, or "other metals, or earthy matters containing iron or other "metals."

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 12.—N° 1190.

SAXBY, John.—"Improvements in the mode of securing the "rails on railways."

"First, in a new mode of securing the keys of chairs so as to "prevent them from falling out or getting loose, by casting a "hole horizontally through one of the jaws of the chair, through "which a bolt is passed having a screw and nut at one end, the "other end being bent, forming an L bolt, or a head may be "formed on it. This head bears against the larger end of the "wooden key, and the nut being screwed up tight holds the key "in its place."

"Second, in preventing the creeping or running of the rail by "forming a countersunk hole in the rail next the jaw of the "chair, in which is placed a stud, the head of which being placed "behind the key, is held in place by it. The stud projects through "the rail and bears against the jaws of the chair, and thus prevents "the creeping of the rail."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, May 14.—N° 1208.

LEAHY, Matthew.—"Improvements in apparatus for facili-"tating the draught of carriages."

"It is proposed to fit on the axles, and on each side of the

" bearing wheels, an eccentric, upon which revolve freely a pair " of disc wheels. Each pair of disc wheels carries an endless " chain of short lengths of rail. These endless chains support " the bearing wheels, and serve as endless railways for the " vehicles to run upon. The object of the eccentricity of the " disc wheels is to prevent the endless chain from coming in " contact with the peripheries of the bearing wheels, except at " the actual bearing point, by which means a great portion of the " strain on the joint pins of the rails and the friction attendant " upon the working of the rails round the wheels as the whole " advances is prevented."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, May 24.—N° 1276.

HANSFIELD, JAMES.—(*Provisional protection only.*)—" Im" provements in the permanent way of railways."

" In having rails made in two parts, longitudinally and " vertically joined together, in such manner that the ends of each " length forming one side shall be in or about the middle of the " opposite side, thus will each length overlap the other, which may " be secured together by any suitable means."

[Printed, 4*d*. No Drawings.]

A.D. 1859, June 2.—N° 1351.

SALTONSTALL, FRANCIS WALTER, and BUSH, ALFRED.— " An improved machine or apparatus for dredging and exca" vating."

" A framework of wood is formed, which for excavating opera" tions may be mounted on wheels running on rails, and for " dredging operations may be as a floating raft. To the frame" work are affixed a swing crane and platform, a scoop or bucket " of peculiar construction, a small boiler engine, wheelwork, and " winding barrel for coiling the chain around during the raising " of the implement employed for excavating or dredging, and a " stud wheel and chain for swinging and holding the jib of the " crane in any desired position."

" A slot is formed in the top part of the crane, about midway " between the post of the crane and the end of the jib thereof; " in this slot a spur wheel is placed, and revolves by an endless " chain passing over stud wheels respectively fixed on the axis of

" the spur wheel, and the axis of another wheel situated near the " platform of the crane. The spur wheel takes into a rack fixed " to a long piece of square timber, to the lower end of which is " fixed a sheet iron scoop formed with a moveable bottom. The " scoop is suspended from the end of the jib by a fork-shaped " piece of metal hinged to the sides of the scoop, said piece of " metal carrying at its upper end a pulley over which passes a " chain which proceeds from the winding-on barrel, through the " post of the crane, and over pullies attached to the top of the " jib."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1859, June 3.—N° 1367.

KYLE, JOHN.—(*Provisional protection only.*)—" Improvements " in points for railways, and chairs for the same."

" Informing the switch rails of double-faced I rails, but in place " of rounding off the inner sides of rail heads, it is preferred to " form them at an angle to the vertical sides of the rail, for the " purpose of obtaining additional strength and economy in the " manufacture thereof."

" The switch rails are fitted into heel chairs of a suitable form, " and secured by a vertical pin or rod passing up through a hole " in the rail, and upon which the rail works for a short distance " in a lateral direction."

" The chairs of the road rails which are within the range of the " switch rails are formed on their inner sides with a long, broad, " flat base, forming a bed on the top of the sleepers for the switch " rails to work upon, and the inner side of a portion of the chairs " of the road rail are cast with a projection on the side thereof, " which takes into the hollow side of the switch rail, and portions " of the switch rails are recessed to admit portions of the chairs " near their outer ends taking thereinto."

" Over the first sleepers in advance of the heel chairs each " switch rail is provided with a shoe or bracket chair or support " having a broad base, and which is secured to and moves with " the switch rails, which, with a transverse rod connecting the " outer ends of the switch rails, keep them securely in their proper " position."

" These improved switches are acted upon as follows :—A short " rod is attached to one side of one of the switch rails, and

" extends through a hole formed through the side of the road " rail. To this rod a weight is attached by a chain or strap, or " other mechanical equivalent, which works over a pulley mounted " within a well or chamber formed in the ground so as to admit " of the weight rising and falling therein."

[Printed, 4*d*. No Drawings.]

A.D. 1859, June 4.—N° 1379.

JAMES, CHRISTOPHER.—" An improvement in the manufacture " of railway chairs."

" To manufacture railway chairs of wrought iron of any of the " ordinary forms now adopted for cast-iron chairs, by the combined use of a cast-iron or other mould and hydraulic or other " powerful pressure, in contradistinction to rolling pressure, the " mould is fitted with a case, which is to form the seat of the " chair. In the mould is placed a ball or lump of wrought or " puddled bar iron, wrought to a welding heat, and by means of a " ram or die actuated by hydraulic pressure, the soft iron is forced " into the cavities of the mould, and thereby produces a chair in " wrought iron."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1859, June 13.—N° 1423.

CORLETT, HENRY LEE.—" Improvements in rails, and the " permanent way of railways, parts of such improvements being " applicable to common roads."

" An improved joint chair, for bridge and other rails, having " large bottom flanges; an oval form and construction of rail; " and to a method of laying rails combined with pavement, on " common roads or streets."

" The improved joint chair may be either pinned down upon " the sleeper, or simply suspended from the rail between the " sleepers. As applied to the ordinary bridge rail, the rail bearing " surface of the chair has a rib formed upon it which fits into the " hollow of the two rail ends, and serves to maintain them in " proper lateral adjustment. The flanges of the rails are slipped " under projecting lugs cast in one piece with the chair, and the " rail ends are held down firmly on to the chair by metal wedges, " which are interposed between the upper surface of the flanges " of the rails and the under surface of the overhanging lugs of the

" chair, such wedges being tightened up by means of one or more " screw bolts passed through the lugs, and bearing upon the outer " edge of the wedges so as to force them inwards."

" The improved rail is intended to be laid with or without " sleepers, the earth in the latter case being simply banked firmly " up to it on either side. For this purpose two broad flanges " serve as bearing surfaces for the rail; and it is proposed to construct it in two parts rolled separately, and afterwards bolted " together longitudinally. The bearing surface for the wheels, " and supporting flange, is made considerably heavier than the " bearing flange for supporting the rail, although when laid in " common roads it might be used as a tramway for ordinary " vehicles. The junction flanges of the two halves of the rail " through which the bolts are passed which connect them together, " may be of a slightly bellied form, and a recess is formed in one, " into which a corresponding part on the other fits accurately. " These flanges, when put together, will come in contact at their " outer edges and so form a firm and steady junction."

[Printed, 1*s*. Drawing.]

A.D. 1859, June 16.—N° 1444.

BARROUX, Leon.—" A new system of railroad supported on " iron soles, with or without wood being used."

" The connexion of the rail with the sole is obtained, on the " inside of the rails, by an iron clasp rivetted on the sole; on the " outside, by a key grooved as it were into another clasp or hook also " rivetted on the sole, and which supports the action of pressure. " A small piece of sheet iron, the end of which, bent down on the " head of the key, prevents any loosening caused by the vibration " of the railway. The rails are joined in the centre of the length " of the sole; at this point the inside clasp unites the two extremities: on the outside a key or bolt at each extremity seems " better for the security of the several parts of the railway. This " method of connecting seems to exclude all possibility of " shifting, and consequently attains the same result as splints, " but in a much surer manner."

" To preserve the separation of the two lines of rails which form " the railway: in this there are two methods of proceeding. The " first by placing in the middle and at the extremity of each " length of rail or sole a wooden sleeper, of which the cube is

" about half that of an ordinary sleeper, and to fix to it the soles " and the rail by means of iron pins. The slope of the rail is then " regulated by means of notches in the wood, the same as is done " for railways on bearings."

" Second, by substituting angle irons for the sleepers, with " sufficient dimensions to have the necessary transverse resistance. " The extremities of these cross pieces are in such a manner as to " give the rail the necessary inclination. The cross piece is placed " in the centre of a sole, and fastened to it by means of a system " of fastening the same as that which is already employed for the " rails."

[Expired 3rd year. Printed, 1*s.* 2*d.* Drawings.]

A.D. 1859, June 22.—N° 1498.

BUCKWELL, William.—(*Provisional protection only.*)—" Im" provements in manufacturing materials for building and other " structural purposes, and of the machinery applied thereto, " which last invention is applicable to other purposes."

" First, in subjecting matter in moulds to pressure of impact, " by causing one or more rollers to pass quickly over it to com" press or consolidate, and to make or form the required surface, " which may be plain, corrugated, surated, ridged, curved, " indented, or otherwise."

" Second, in forming paving, flooring, weirs, or other works, as " a structure more or less continuous, by subjecting the com" ponents of which it is desirable it should be formed, to the " pressure of rollers."

" Third, in first forming moulds so that any amount of pressure " may be applied independent of the mere weight of the rollers; " and, secondly, the forming of railways with adjusting fixing " pins, chairs, &c., for rollers to any required surface on the " ground, or in the place or position required."

[Printed, 4*d.* No Drawings.]

A.D. 1859, June 22.—N° 1506.

APPERLY, James, and CLISSOLD, William.—" Improve" ments in the manufacture of wheels for carriages and engines."

" To facilitate the traction of carriages on common roads and " irregular ground, by applying to the periphery of the travelling

" wheels of carriages bearing surfaces, which, as the pressure of " the rolling wheel is brought upon them, will arrange themselves " on the ground, so as to form a comparatively even bed for the " wheel to roll over. These bearing surfaces are formed either of " links rivetted together, and constituting an endless chain, " which is let into a grooved periphery, or detached pieces which " are held in place by being let into an annular groove formed in " the periphery of the wheel, and furnished with overlapping lips. " Between these bearing surfaces and the tyre of the wheel we " place a ring of vulcanized india-rubber or elastic bed, which " will yield as pressure is put upon it by the rolling wheel, and " will thereby allow the bearing surfaces to arrange themselves " in succession in a line upon the ground."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1859, July 4.—N° 1591.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Job Johnson.*)—" A cementing powder or mixture, and process for " cementing, converting, refining, strengthening, and steelifying " iron."

The patentee says:—" I take quicklime, free from earthy sub- " stances, and add to it an equal quantity of bone dust, and a " like quantity of charcoal. I then mix these ingredients inti- " mately, and expose them to the influence of the weather for " one or more days, according to the condition of the atmosphere. " I then take any convenient form of cementing or converting " furnace, and commence by spreading a layer of the mixture on " the bottom, and interstratify the articles of iron to be operated " upon with the mixture on the bottom, and interstratify the " articles of iron to be operated upon with the mixture till the " furnace is charged, taking care to assort the various articles, so " as to insure the required uniformity of treatment. I then close " and lute with fire clay, so as to prevent access of air and apply " heat externally, testing from time to time by means of trial " pieces, which can be removed at pleasure."

" Iron subjected to this treatment assumes great rigidity and " hardness without losing its property of malleability and duc- " tility. Shafting, piston rods, and such like may be hardened " and strengthened by an exterior coating of steel. In like " manner railway bars, wheels, chains, anchors, anvils, and large

" articles generally, may be hardened and strengthened to any
" required extent."

[Expired 3rd year. Printed, 4*d*. No Drawings.]

A.D. 1859, July 11.—N° 1649.

BURDEN, Francis.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

" In constructing a continuous longitudinal metal sleeper by " bending together sides of trough iron, and securing the rail in " the jaws thus made. The broad base of the trough iron will, " in most cases, be sufficient to support the way without the " employment of transverse sleepers under the longitudinal " sleepers, but in loose or sandy foundations the upright pile " may be driven at intervals under and form a bearing for the " base of the trough iron."

" And in the construction of a way intended to be laid on " loose and sandy foundations. A hollow or solid cast of " wrought-iron pile or bar is used, and provided at the bottom " with a broad screw or nut. This pile may be used by itself " as a support for the trough iron sleepers as well as for other " descriptions of sleepers."

[Printed, 4*d*. No Drawings.]

A.D. 1859, July 12.—N° 1654.

WRIGHT, Thomas.—" Improvements in the permanent way " of railways, and in the means of preventing railway accidents " thereon."

" Firstly, in employing a rectangular cast-iron bed plate " sleeper, having the two rail-bearing surfaces and the transverse " ties cast in one solid piece, with a timber or india-rubber trough " cast on the top surface of the bearers, and a ballast fang on the " under surface. Or, of a rectangular casting, with the addition " of a safety curb projecting above the ordinary rails, upon which " the engine runs. In conjunction with which curb is employed " a 'life guard,' attached to the framing of the engine and " carriages, and descends to within a short distance of the top of " the safety curb. On a break down occurring, or the train " running off the rails, these guards and curbs support and " confine the engine and train to the rails."

"Thirdly, in certain peculiar constructions and arrangements "of cast-iron transverse joint sleepers, by casting the entire "sleeper, with its transverse tie bar and rail-bearing bed plates in "one solid piece, the intermediate bed plate sleepers being "detached."

"Fourthly, in an improved 'vice-jaw' fastening, wherein the "loose jaw, which is of wrought iron, is made to bear against the "top and bottom of the rail."

"Fifthly, in constructing a double-headed flanged rail, which "may be made to form either a rail and sleeper combined, or "applied to transverse or longitudinal wooden sleepers. The "joint clip to be used therewith consists of a trough made of "rolled iron in one piece, or of boiler plate, which grips the "under side of the rail ends. This clip, by increasing its width "and length, may also be made to form a longitudinal wrought-"iron sleeper, the rail being secured to its lateral flanges by pins "or bolts, thus forming an entire wrought-iron permanent way."

"Sixthly, in certain improved combinations of rails to be laid "in streets, railways, or roads, and consists in casting the rail "and sleeper in one longitudinal piece. These combined rails "and sleepers have single or double grooves or channels cast in "their upper or wheel-bearing surfaces."

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1859, July 20.—N° 1707.

CAITHNESS, EARL OF.—"Improvements in the permanent "way of railways."

An improvement in switches, which is the same as in his Patent A.D. 1859, N° 219.

"And to combine, by means of rolls, a T-shaped steel bar "with two wrought-iron L-shaped bars, in such manner as to "produce an I-shaped rail, with the steel rail in the centre, and "forming the wheel-bearing surface."

"And to cover the wheel-bearing surface of the ordinary "double-headed rail with a layer of steel, by rolling the rail in "combination with a steel plate. Old or worn rails may also "be treated in this manner, thereby rendering them as good as "new again."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1859, July 30.—N° 1773.

PARSONS, Perceval Moses.—" Improvements in switches " and crossings of railways."

" In constructing switches, the tongue rails are connected " with the main rails by means of brackets attached to the rails " on each side, so as to form joints on which the tongue rails " turn, and the point rail is formed of cast steel or iron, and " is combined with wing rails of steel; the point and wing " rails are secured together by right and left-handed screws " passing through the hole. The wing rails are made of the " ordinary double-headed form except that opposite the point " where the flanges of the wheels do not come in contact with " them they are made square on the inner edge of the table or " head in place of being rounded off at this edge as is usual; " thus a greater surface is obtained to support the wheels in " passing the points."

" The point and wing rails are so formed that the point rail " houses itself under the wing rails when they are brought in " contact with it."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, August 9.—N° 1847.

MACLELLAN, Walter. — (*A communication from John Gregory.*)—" Improvements in parts of the permanent way of " railways."

" Each sleeper is cast in the bridge form, and on the crown of " this is cast, solid with it, the rail chair. The sleeper is of an " undulating form, so as to be elastic. The sleeper is quite open " on each side, and strengthened internally by ribs. Each sleeper " is disposed at a right angle with the line of rail, and the pairs " are tied together transversely by a wrought-iron tie rod. For " this purpose the sleeper has a central longitudinal aperture cast " in it on each side of the spring of the arch. These holes have " collar pieces cast on round them to receive the ends of the " transverse ties and permit of a substantial fastening of the rod " ends. The transverse tie bars are purposely made thin and " deep, so as to form a central rib for the base of the sleeper, and " give an increased hold upon the ground, and the ballast is " rammed up against the tie at the part where it passes through " the sleeper from each open side of the latter. The chairs,

" which may be of any suitable form, may be disposed on the " sleeper either with thin rail line in line with, or at right angles " to the arch of the sleeper, and they may either be cast on or " separately attached."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, August 10.—N° 1852.

CAPPER, George.—" Improvements in the permanent way of " railways."

" A new method of connecting the rails together at or near " their ends, and consists of two pieces of wrought iron about " two feet long, the ends whereof are bent downwards and again " bent to the shape of the rail so as to form flanges or feet which " are intended to be fixed by trenails or screws to the sleepers of " the railway, one foot resting on one sleeper and the other foot " on another sleeper. It is proposed to use two of these wrought-" iron plates at opposite sides of the rails, at their points of " junction, and connect them and the rails together by bolts and " nuts, the bolts passing through holes in the rails and plates."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, August 18.—N° 1900.

CANU, Adolphe Joseph.—" Improvements in machines for " breaking or crushing stones, minerals, or other similar ma-" terials."

" In providing such machines with a series of cylinders or " truncated cones of suitable material, revolving on their axes at " high velocities in the same direction, and striking with their " surfaces against the materials to be crushed, these surfaces being " either smooth or fluted, corrugated, or provided with proper " teeth or projections, in order to throw the materials from the " surface of one cylinder or cone to that of another, while the " axis of these latter are situated in a vertical position at such " distances apart as to form a sort of grating with lateral open-" ings, underneath which cylinders a circular plate revolves hori-" zontally. The materials to be broken are thrown on the grating, " where they come in contact with the surfaces of the cylinders, " and afterwards escape through the opening left between the ,, lower end of the said cylinders and the upper surface of the " rotating plate."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, August 26.—N° 1948.

MACLELLAN, WALTER.—(*Provisional protection only.*)—" Im-
" provements in rolling or shaping iron for railway spikes and
" other purposes."

" It consists in so shaping the rolls that the bar iron out of
" which the spikes are to be made is rolled in them with alternate
" round and square sections. For this purpose the rolls are cut
" or grooved on their peripheries angularly and curvilinearly in
" alternating sections, the relative lengths of the sections being
" proportioned to the sizes of the articles to be produced. In
" this way, when the bars are cut up into spike lengths, all that is
" further necessary is to form the spike heads."

[Printed, 4*d.* No Drawings.]

A.D. 1859, August 27.—N° 1951.

WRIGLEY, FRANCIS.—" Certain improvements in the construc-
" tion of the permanent way of railways."

" First, in forming chairs with circular boss projections from
" the bottoms, to fit into corresponding recesses in the sleepers.
" Secondly, in a novel method of holding up and securing the
" rail within the chair by means of two supports or carriers (one
" being moveable) which fits into and supports the rail from the
" under side of the top flanch. The lower flanch of the rail
" being kept free from contact with the internal base of the chair
" is thus perfectly preserved from injury, and when required
" to be reversed will be found for further service equal to
" a new rail. The internal part of the chair on one side is
" formed to fit the edge of the lower flanch or rib of the rail,
" against which it is firmly held by the moveable key piece being
" forced against the opposite edge of the rail by the trenail or set
" screws thereby firmly holding and preventing the possibility of
" any upward or lateral action of the rail. This description of
" chair is equally applicable to and well adapted for securing the
" junction of the rails as a joint chair, superseding the necessity
" for fished joints."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1859, August 31.—N° 1986.

SAMUEL, JAMES.—" Improvements in railway sleepers."

" In constructing transverse sleepers for rails of wrought iron

" in one piece, with troughs or recesses sunk therein, or otherwise " made, for containing or carrying the rails which are secured in " the troughs by means of keys or wedges. Ribs may be formed " on the upper and under surfaces of the plates composing the " sleepers to serve the double purposes of securing the keys or " wedges from longitudinal motion, and of imparting strength " to the sleepers."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, September 9.—N° 2063.

CORNELY, Sigismund.—(*A communication from Messrs. Legaire and Pauwels.*) — "An improvement in the permanent way of " railways."

"In employing transverse sleepers formed of a bar or sheet of " iron, having a chair formed at each end by bending the bar. The " outer jaws of the chairs are formed by bending the ends of the " bar upwards, and the inner jaws by making three bends in the " bar. Sleepers and chairs thus constructed may be used in conjunction with ordinary double-headed rails which may be secured " in the chairs by wooden keys."

[Expired 3rd year. Printed, 6*d*. Drawing.]

A.D. 1859, September 12.—N° 2075.

HEINDRYCKX, Floride.—" Improvements applicable to rail- " ways or tramways."

"In constructing chairs or supports of flat or other suitably " shaped bars of wrought iron, which are cut up into suitable " lengths, heated in a furnace, and then bent up into the required " shape by machines. The rails are secured in these by means of " wooden keys or wedges, and the supports or chairs are secured " to the bearings in any convenient manner. For railways or " tramways of narrow guage, the chairs or supports for both rails " may be made on the same bar of iron."

[Expired 3rd year. Printed, 1*s*. 6*d*. Drawings.]

A.D. 1859, September 13.—N° 2084.

ADAMS, William Bridges. — " Improvements in the per- " manent way of railways."

"First, in spikes or screws for chairs, made with a square or " hole, or both, at the top to turn them round, and a washer of

" metal in a conical nick to fit elastically a large-sided conical " hole in the chair."

" Secondly, metal keys as a substitute for wood keys, to secure " rails in chairs, which keys may be elastic to drive in without " splitting or damaging the chairs; the rail being suspended by " the upper table or support below, the sectional form of the keys " being various angles or curves, and they may be made with a " catch, or other methods of securing, and the keys may be on " one or both sides of the rail, and applied in combination with " wood both for joints and for intermediates."

"Thirdly, improvements in girder rails, securing angle irons to " the rails by key bolts, and using the angle irons so that both " rails and angle irons, either of cast or wrought iron, may be " lightened in weight; and also girder rails rolled in one piece, " with their bearing flanges and improved joints to connect them, " the rails having either one, two, three, or four bearing surfaces; " and also a mode of forming cast-iron rails and crossings so that " they will not chip at the joints."

" Fourthly, peculiar formed chairs to use with one or two keys, " either to suspend or support the rails, the peculiarity being in a " notch or groove across one or both jaws of the chair to keep " the key or keys in position vertically."

" Fifthly, improved key bolts being of sectional form to give " vertical and lateral strength, reducing the bolts in weight, and " being secured with a head and one key, or with two keys without a head."

" Sixthly, improved cast-iron sleepers, with chairs cast on them " (*i.e.*), the chairs described under the fourth head, are expanded " into a base to dispense with timber-sleepers."

[Expired 3rd year. Printed, 2*s*. 6*d*. Drawings.]

A.D. 1859, September 16.—N° 2108.

LAUTH, Bernard.—" Improvements in the manufacture of " rails for railways."

The patentee says:—" The object is to increase the strength of " the rails, and thus to enable them to withstand the wear and " tear for a prolonged period. To effect this I submit them, when " rolled into shape by the ordinary method and when in the cold " state, to pressure between rollers. The machinery for this purpose may be somewhat similar to any usual rolling apparatus."

[*Printed*, 6*d*. Drawing.]

A.D. 1859, September 19.—N° 2124.

TAYLOR, Edward Henry.—" Improvements in the mode of " securing the bolts in fish-joint and other fastenings for rails on " railways."

" One mode is by cutting a piece of sheet iron with slots in it " to form prongs, corresponding and filling up the space between " each nut or bolt head, forming an additional skeleton fish plate, " so that when it is driven downwards between the fish plate and " the nuts, each prong will press against the sides (and tops) of " the recessed part of the nuts and keep them perfectly wedged."

" Another mode is by making a flange of any suitable strength " at or near the top or bottom, or both top and bottom, of the fish " plate, with a longitudinal groove below or above the flange, " according as it is placed at the top or bottom of the plate, and " a wedge is passed through the said groove, or one through each " of the grooves which projects and holds against the flange and " the inner side or recesses of the nuts or bolt heads, thus holding " them perfectly tight."

" Also in making on the side of the nut next to the fish joint a " notch or groove so as to intersect and bear upon the hole in " the nut through which the bolt passes, and in cutting away a " portion of the bolt so as to form a flat surface corresponding " with the groove in the nut when screwed up. After the nut is " screwed up there will thus be a recess, consisting partly of the " groove in the nut, and partly of the recess in the bolt, and into " this recess is driven down a pin, cotter, or wedge, and thereby " the nut is prevented from turning and the bolt from becoming " loose."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, September 30.—N° 2215.

BUCKHAM, Thomas.—(*Provisional protection only.*)—" Improvements in the switches for railways."

" This invention relates to the switches employed for guiding " railway trains and engines from one line of rails to another, and " consists in a novel mode of uniting the end of the tongue or " moving rail of such switches to the abutting rail of the line by " a system of hinges or jointed fish plates, instead of by a pin " passing through the rail and chair. The straps of the said

" hinges or joint fish plates are securely bolted to the body of the " tongue rail in one side, and to the abutting rail on the other, " thus forming a hinged fish-joint, giving perfect stability and " security to the tongue, and at the same time freedom of move- " ment, which is effected by the upper jaw of the hinge joint " acting as the centre or fulcrum on which the tongue turns " whilst the lower jaw has its hole (in which the fish-joint fits) " slotted in the direction of motion."

[Printed, 4*d*. No Drawings.]

A.D. 1859, September 30.—N° 2223.

COCHRANE, William Erskine.—" Improvements in chairs " and apparatus for receiving and securing the end of the rails of " railways."

" For these purposes in constructing chairs the inner surface of " one of the jaws of each chair is made to fit one side of the " rails; the inner surface of the other jaw is made with a hori- " zontal groove and two vertical grooves, and there is a suitable " space between this jaw, which it is preferred should be upright, " and the surface of the rail to admit of a plate being slid down " between the jaw and the side of the rail, such place having " thereon two ribs or projections suitable for entering the vertical " grooves in the inner surface of the jaw; or the grooves and ribs " or projections may be reversed by having the ribs or projections " on the jaw and the grooves in the plate.

" The horizontal groove is to receive a wedge or key to force up " the plate to the side of the rail."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1859, September 30.—N° 2224.

EDWARDS, William Vaughan.—(*Provisional protection only.*) —" Improvements in the construction of ways and apparatus to " facilitate the conveyance of mails, goods, and passengers."

" For these purposes a tunnel or enclosed passage is con- " structed with iron plates laid underneath or on the soil between " distant places, with arrangements for stopping at the terminal " and at intermediate stations to deliver and take mails, goods, " and passengers. At the lower part of such tunnel or enclosed " way two parallel rails or trains are formed, by preference, in

" longitudinal grooves or recesses, or the rails or trains may be " dispensed with.

" The carriages which run in this tunnel or enclosed way have " each four wheels, two before and two behind."

[Printed, 4*d.* No Drawings.]

A.D. 1859, October 1.—N° 2226.

PARKIN, William, and BATES, James.—" Improvements in " wedges for railway chairs."

" The wedges are made of cast iron or other suitable metal, and " from each wedge with a slit or slot lengthwise, extending from " one end to nearly the other, in order to allow the wedge to ex" pand and contract.

" The slit or slot is formed to admit of a nut, the bolt of which " passes through a hole in the outer side of the wedge, so that " when the latter is inserted between the rail and the side of the " chair the nut can be placed in the slit or slot, and the bolt " passed through the hole and afterwards screwed up, so as to " enlarge or expand the wedge to any required tightness, thus " securing it in the first instance, and afterwards tightening it, " as it may give way or become loose by wear and tear. A slotted " metal wedge is expanded by driving a pin or key between the " sides of the slot, and thereby force the outer sides of the wedges " against the rail and chair."

[Expired 3rd year. Printed, 6*d.* Drawing.]

A.D. 1859, October 8.—N° 2291.

IRLAM, William.—" Improvements in the construction of rail" way turntables and cranes."

The patentee says :—" First, in certain improvements upon the " turntables for which Letters Patent were granted me A.D. 1856, " N° 3065.

" The present improvements consist in making the girders of " such turntable platforms and the beams for connecting them, " and for the centre pin, and the chairs for the rails altogether of " one solid piece of cast iron, thereby increasing the strength, and " economizing labour."

" Another part consists in making the chairs for the lower " ring to support the guard or catch ring and the planks

" or plates forming the pit and the rails of the permanent " way."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1859, October 12.—Nº 2326.

TAYLOR, Edward Henry.—(*Provisional protection only.*)— " Improvements in apparatus applicable to the permanent way of " railways."

The patentee says :—" To prevent the bolts used in fish joints " and chairs on railways from becoming loose by constant wear " and tear, I make a flange of any suitable strength on or near the " top of the fish plate having a longitudinal groove, so that I can " pass a sliding wedge through the said groove projecting against " the inner side of the nuts or bolts, which I form with suitable " recesses or grooves, thus holding them firmly and preventing " them moving by traffic."

[Printed, 4*d.* No Drawings.]

A.D. 1859, October 9.—Nº 2392.

SETON, Charles.—" Improvements applicable to the wheels " of carriages generally, for the purpose of reducing the draught " thereon."

" In turning a recess at one or both sides of the felloe of the " wheel to receive the flange or turned up edge of a flat piece of " metal, said flange being kept in the recess by a ring of metal " affixed to the felloe of the wheel, at one or both sides, the flat " piece of metal is hinged to other similar flat shaped pieces into " the form of an endless belt, which should encircle closely the " felloe of the wheel to which it is applied, the flat ring keeping " said belt in proper position on the felloe sideways."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1859, October 27.—Nº 2456.

MICKLES, Philo D.—(*A communication from Danforth Johnson.*)—(*Provisional protection only.*) — " An automatic railway " switch."

" In a switch so arranged that it is moved by the front " wheels of an approaching train without reliance upon the " attention of any one, and also that the train itself prevents its

" being displaced. To the framework which supports and carries " the switch is connected a compound lever composed of two levers, " the other end of which compound lever terminates in a broad " or expanded part which lies between the inner rails of two con- " verging tracks, and which is acted upon by the flanges of the " wheels, and thereby the switch is operated."

[Printed, 6*d.* Drawing.]

A.D. 1859, October 27.—N° 2459.

ORDISH, Rowland Mason. — " Improvements in railway " fastenings."

" In constructing elastic metallic keys with one or more " surfaces roughened or serrated, such roughenings or serrations " fitting into corresponding roughenings or serrations, formed " upon the jaws or other parts of metallic chairs, clips, or sleepers, " or formed upon suitable pads, blocks, or keys. The action of " the elastic metallic keys is such that by forcing the elastic keys " or the pads, blocks, or keys into their required positions, the " elasticity of the material enables the roughenings or serrations " to pass or ride over the corresponding ones, and by the reaction " of the elastic keys, the various parts are retained and secured " in the required positions."

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1859, October 28.—N° 2466.

GREAVES, Hugh.—" Improvements in constructing the permanent ways of railways, and in preparing parts thereof to " prevent oxidization."

" In an improved longitudinal wood sleeper road to give a " more efficient bearing surface with a smaller amount of material " than heretofore. For this purpose two longitudinal sleepers are " used in combination with wrought or cast-iron chairs for " supporting each rail."

" In a new adaptation of Greaves' surface packed sleepers by " the employment of two such sleepers of smaller dimensions, " connected together by a wrought or cast-iron chair, or by a " piece of metal or wood on which the chair for supporting the " rail rests, instead of single sleepers."

" In a new arrangement for securing tie bars."

" In an improvement in chairs constructed of cast iron, by

" casting the jaws of the chairs or sleeper chairs hollow, thereby " giving greater strength with the same amount of material. The " improvements in moulding them consist in withdrawing from " the sand the whole of the two jaws at one movement, or part " of the jaw may be withdrawn first, and the other part after- " wards, and in producing the hollow print in the patterns from " which the top box is moulded. The wrought-iron chair is " made from a piece of flat bar iron bent in the form to receive " the rail, and fastened by iron rivets to the sleeper."

" In heating sleeper chairs, and while so heated, dipping them " in a preparation of gas tar, petroleum, or other bituminous " material."

" And, in a new form of cast-iron sleeper which may be cast " vertically, and which holds the rail by its own elasticity without " the intervention of wood keys, the gauge and angle of the rail " being maintained in the usual way."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1859, November 15.—N° 2585.

WARD, William Henry.—" An improved turntable for rail- " ways, and other purposes."

" First, in supporting and centering the turning platform of " the table without the aid of the central pivot, by means of " hollow spherical balls, or spherical tread wheels arranged " between circular-grooved tracks, of such form in their cross " section as to admit freedom for said balls or wheels to turn."

" Second, in operating the table by means of a crank shaft and " gear wheel near the centre of the platform."

" Third, in supporting the ends of the track timbers by means " knee joints."

" Fourth, in operating the knee joints by means of a hand " lever near the crank shaft for convenience, while operating the " table."

[Printed, 6*d*. Drawing.]

A.D. 1859, December 6.—N° 2757.

COIGNET, François.—" Improvements in the manufacture of " beton or composition applicable for purposes of covering, " building, and construction, and for various uses, as artificial " *stone*."

The patentee says;—"The improved betons admit of agglo-
" meration, and they are applicable for constructing sea walls,
" embankments, and other works exposed to the waves, tunnels,
" monolyth surfaces and structures, turntable wells, and other
" railway works, telegraph wire protectors, and many other
" purposes."

[Printed, 6*d*. No Drawings.]

A.D. 1859, December 14.—N° 2840.

BENTLEY, SAMUEL, and STRINGER, JOHN. — "Certain
" improvements in railway chairs."

" In forming one side bearing on the base of the chair, and
" connecting the other by a hinge joint, and holding the two
" together for clipping the rail by a screw bolt or bolts passing
" through them and the rail; by this arrangement the rail may
" be removed for the better adjustment, or to reverse it, or for
" any other purpose. When using these chairs for receiving the
" two ends of rails, two bolts and screws are used, one to pass
" through the end of each rail, but for intermediate ones one
" screw bolt will be found sufficient. In manufacturing these
" chairs from wrought iron, it is purposed to bend them into the
" desired shape in a hot state by suitable tools, nevertheless they
" may be cast in the ordinary way."

[Expired 3rd year. Printed, 8*d*. Drawing.]

A.D. 1859, December 17.—N° 2879.

CLARK, WILLIAM. — (*A communication from Messrs. Auguste Desgoff and Leon Jacquean.*)—"Improvements in the supports or
" chairs of railway rails."

" The improvements are equally applicable to joint or ordinary
" chairs. They may be used without the intervention of fixed
" holding wedges or bolts, avoiding injury to the ends of the
" rails by piercing or otherwise, as also all drawing of the dowels,
" and consequently produces a saving in the wear of the sleepers.
" In these improved arrangements of bearings the weight of a
" train is utilized to produce the lateral binding of the rail. For
" this purpose one side of the chair or support forms a fixed
" wedge or bearing for the rail during the passage of a train."

[Expired 3rd year. Printed, 8*d*. Drawings.]

A.D. 1859, December 20.—Nº 2903.

WELCH, Alfred.—(*A communication from James Welch.*)—
" Improvements in portable railways to facilitate the movement
" of carriages on common roads and other surfaces."

The patentee says :—" Instead of uniting the links to each
" other by means of a hinge joint as in the former Patent,
" A.D. 1857, Nº 2504, they are merely connected by means of an
" endless chain or flexible metal band, or other suitable con-
" trivance, to which each link of the railway is fastened at the
" middle on its upper side, as it lies in position for the passage
" of the wheel over it."

" The general form of the links of the railway, as in the pre-
" vious Patent, is preserved; but in order to retain them in their
" proper position instead of the hinge joint, one end of each link
" is shaped into a tenon so made as to pass freely into and out
" of a corresponding mortice or socket formed in the adjoining
" end of the next link, and so on in succession, thereby admitting
" of their readily accommodating themselves to the constantly
" varying position of the different portions of the railway in its
" progress round the carriage wheels."

[Expired 3rd year. Printed, 4*d.* No Drawings.]

A.D. 1859, December 21.—Nº 2912.

ABBOTT, William.—(*A communication from James Campbell Francis Calvert.*)—(*Provisional protection only.*)—" An improved
" method of preserving timber, particularly adapted for railway
" purposes."

" The timber which, in preference is to be the 'pitch pine,' or
" other timber containing resinous matter, is to be cut the desired
" length and size, and then subjected to heat, which has the effect
" of bringing a portion of the resinous matter to the surface, and
" forming a hard coat or crust, at the same time drying the sap
" within the wood, thereby adding to its strength, and preventing
" any absorption of moisture."

" This process being well adapted for railway sleepers, telegraph
" posts, and all building purposes."

[Printed, 4*d.* No Drawings.]

A.D. 1859, December 27.—Nº 2950.

TRUSS, Thomas Seaville.—"Improvements in the mode of "packing or cushioning railway chairs, pillars, pipes, girders, "and engines, by the use of animal and vegetable fibre packing "chemically prepared."

"To prevent or lessen concussion or jar, when applied to "railway chairs, pillars, girders, engines, or other machines, and "to make water and air-tight joints when used to secure the joints "of pipes.

"The animal fibres chiefly used are wool, cow hair, and dog "hair; the vegetable fibres which are chiefly used are hemp, "flax, and cotton. The chemical preparation to which they are "submitted to protect them from the action of the acids or gases "is steeping them or passing them through an alkaline solution "or otherwise coating or filling them with alkalines, and afterwards, "or at the same time, coating them with cold or hot "grease, pitch, or tar, or these substances combined; the alkalines "employed are potash and soda, and for most purposes, "in the proportion of about one part alkaline to four parts "water."

[Printed, 4*d*. No Drawings.]

A.D. 1859, December 31.—Nº 2996.

GIBSON, Robert.—"Improvements in the permanent way of "railways, and in the manufacture of parts of the same."

"First, in securing wooden keys in railway chairs:—On one "side of the key is formed a groove in which is inserted a piece "of iron enlarged or bent at one end; when the key is driven "home a nail or screw may be inserted through the piece of iron "into the key after the iron wedge is driven close up to the chair; "this will prevent the wedge from receding, and in case the "wooden key requires to be tightened up the iron wedge may be "again driven home against the chair, and a fresh nail or screw "driven in. The projection on the iron key may be inserted in a "hole made in the chair or in the rail, and when the wooden key "is driven home the nail or screw may be put in, in order to "prevent the wooden key from receding; or, instead of a nail or "screw being driven through the hole in the iron key and into "the wooden one, the end of the iron key may be elongated

" beyond the large end of the wooden key and bent for the pur-
" pose of retaining the wooden key, and so often as the latter
" may be driven home so often may the bending of the iron key
" take place."

" And in forming the chairs of wrought iron by stamping in
" suitably formed dies. Bar iron is bent so that its ends may
" form the jaws of the chair, and it is heated to a welding heat
" and then inserted between the jaws of a suitably-formed man-
" dril, and then the whole is placed into a properly shaped die,
" and stamped into the proper shape, and the necessary bolt holes
" are punched at the same time; or, instead of bending the bar
" so as to form the jaws of the chair, loose pieces of a suitable
" form and weight may be laid on to the bottom bar, and the
" entire mass welded as before."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1860, January 3.—N° 10.

HORRIDGE, JOHN.—" An improved iron wheelway for streets
" and roads."

" In a wheelway formed by the arch of a circle of so large a
" radius that, whilst it compels the wheel rolling over it to a linear
" friction, it will permit it to roll in a straight direction. An iron
" plate of the requisite width is bent to the desired convexity by
" passing it sideways between bending rollers. On to each corner
" of the plate is welded a lappet of iron punched through it. The
" lappet bends downwards at a right angle with the cord of the
" arch of the iron plate, so that when the convex plate is placed
" on the coping the holes of the lappet will fall opposite to hori-
" zontal holes through the coping of brick or stone. Then by
" inserting an iron screw, with a cotter hole through the lappet
" holes, and through the coping, and the opposite lappet, the plate
" will be tied firmly to the coping by screwing a nut tightly on
" the screwed end of the horizontal pin, or by a bolt with a cotter
" in place of a screw."

[Expired 3rd year. Printed, 4*d*. No Drawings.]

A.D. 1860, January 5.—N° 30.

NEWTON, ALFRED VINCENT.—(*A communication from Benjamin A. Mason.*)—" An improved mode of and apparatus for fitting the
" abutting ends of the rails of railways together."

The object is to cut the ends of T-rails, so as to form a kind of rebate or lap joint. One end of a section of the rail is formed by cutting out one-half of its thickness for a distance of about six inches from the end, and about two-thirds the depth from the upper to the under face of the web, so that the recess formed will present a longitudinal vertical face in the plane of the middle of the thickness of the rail. And in machinery for so cutting the rails on being delivered from the carriage containing them.

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1860, January 18.—N° 132.

KREEFT, Siegerich Christopher.—(*A communication from Carl von Etzel.*)—(*Provisional protection only.*)—" Improvements " in the permanent way of railways."

" In constructing the transverse sleepers of trough iron, " inverted so as to have its concave surface towards the earth, " and well packed beneath. When T or bridge rails are employed with these sleepers the rails may be bolted thereto direct " without the use of chairs. By employing these sleepers the " necessity for tie bars to preserve the gauge of the rails is " avoided."

[Printed, 4*d*. No Drawings.]

A.D. 1860, January 28.—N° 221.

DUNN, Thomas.—" Improvements in machinery and apparatus " for altering the position of locomotive engines and carriages, " and for preventing injury and accidents on railways."

No adequate description of this Patent can be given in a mere abstract, the patentee having filed 41 Sheets of Drawings, and made 55 distinct claims, which are as follows:—

" First, constructing the sides of railway traversers."

" Second, the application of various descriptions of rolled iron, " and beam iron for making the sides, ends, and cross bars of " railway traversers, and angle iron, when made of sufficient " strength to form the rail for wheels of the carriage, and deep " enough to form one side of the traverser."

" Third, constructing the bodies of traversers of steel or homogeneous or wrought-iron plates."

" Fourthly, the application of strips or belts of vulcanized " india-rubber or other suitable yielding material between the "guide rails and low shelving of traversers, and to the platforms "of turntables."

"Fifthly, the placing of all the cross tram rails for the traverser "on the same level as the rails of the permanent way."

"Sixthly, improved modes for supporting the cross tram rails, "and connecting them to the rails of the permanent way."

"Seventhly, supporting the flanged guide rollers of railway "traversers in levers or in bearings acted upon by springs or in "sliding bearings, for the purpose of enabling the flanges of the "said rollers to rise and pass over the rails of the permanent "way."

"Eighthly, the application of the slides or skids, for the "purpose of guiding the traverser on the cross tram rails, whereby "the supporting rollers and the cross rails may be made without "flanges."

"Ninthly, constructing traversers, having elastic points formed "of continuations of the sides, whereby the carriage to be moved "is supported by the flanges of its wheels."

"Tenthly, in self-acting points for traversers, and the hinging "of points to traversers in such wise that they will shut up or "close on coming in contact with any obstacle."

"Eleventhly, in self-acting points for traversers."

"Twelfthly, the application of self-acting points to plate and "pit traversers."

"Thirteenthly, the construction and arrangement of traversers, "whereby the incline for the carriage wheels to run up is pro-"duced by depressing one end of the traverser."

"Fourteenthly, the application of platforms to traversers for "supporting the gearing, and the men by which the traverser is "moved along the cross tram rails."

"Fifteenthly, the general arrangement and improved construc-"tion of pit traversers."

"Sixteenthly, the various improved modes of constructing the "cross tram rails of traversers with steel bearing surfaces."

"Seventeenthly, the application of guards or projections to the "cross tram rails for traversers."

"Eighteenthly, the general arrangement of plate traversers and "the improved modes of connecting the plates."

"Nineteenthly, the general arrangement of frame traversers "and the improved mode of staying or connecting the sides, ends "and cross bars."

“ Twentiethly, the modes of constructing the curbs of railway
“ turntables.”

“ Twenty-firstly, the modes of supporting the curb and curb
“ ring.”

“ Twenty-secondly, supporting the rollers for the platforms of
“ turntables in a double beam or in boxes forming part of the
“ curb.”

“ Twenty-thirdly, the construction of the platforms of turn-
“ tables.”

“ Twenty-fourthly, constructing the curbs and platforms of
“ turntables.”

“ Twenty-fifthly, supporting the rollers for the platforms of
“ turntables on studs fixed to the curb.”

“ Twenty-sixthly, the application of steel rings to the under
“ side of the platforms, which rings bear on the supporting
“ rollers.”

“ Twenty-seventhly, the case-hardening of the supporting
“ rollers of traversers and turntables.”

“ Twenty-eighthly, the application of yielding material, to the
“ rollers of traversers and turntables, to prevent or diminish noise
“ and concussion.”

“ Twenty-ninthly, the casting the rollers for traversers and
“ turntables of cast steel or homogeneous iron.”

“ Thirtiethly, the general arrangement of the turntables.”

“ Thirty-firstly, the arrangement of turntables and modes of
“ connecting the plates of the platforms.”

“ Thirty-secondly, the general arrangement of the turntables.”

“ Thirty-thirdly, the combination of parts for steadying the
“ platforms of turntables.”

“ Thirty-fourthly, the general arrangement of the turn-
“ tables and the double ring for the bearings of the supporting
“ rollers.”

“ Thirty-fifthly, the general arrangement of turntables, and the
“ application of double or treble headed deep bar iron to form
“ the rails and beams.”

“ Thirty-sixthly, the general arrangement and improved mode
“ of constructing turntables.”

“ Thirty-seventhly, the casting the cross rails for railway turn-
“ tables of steel, tough or homogeneous iron.”

“ Thirty-eighthly, the improved beams for turntables and the
“ application of steel to the rails of the platform.”

"Thirty-ninthly, the particular mode of constructing and "securing the beams of the platform."

"Fortiethly, the general arrangement of turntables, in combination with the improvements in connecting the plates of the "platform, and dividing the platform in two or more parts to "facilitate transport."

"Forty-firstly, the application of ratchet wheels to the rollers "of traversers, and the combination of levers for working "them."

"Forty-secondly, the forming the platforms of a centre beam, "either in one piece or connected in the centre of its length, and "combining therewith brackets or cross bearers for supporting "rollers and rails."

"Forty-thirdly, the improved mode of constructing the platform."

"Forty-fourthly, the application of vulcanized india-rubber or "other suitable material to the wedge bars of certain turntables."

"Forty-fifthly, the improved arrangements of switches."

"Forty-sixthly, improved arrangements of switches and crossings."

"Forty-seventhly, improved arrangements of switches."

"Forty-eighthly, the making the switches, and that portion of "the rails over which the rails of the crossings pass of steel."

"Forty-ninthly, the application of portable points and crossings "to railways, which can be laid down and applied to any part of "the line, and afterwards removed without in any way disturbing "the rails of the permanent way."

"Fiftiethly, the application of platforms with moveable points, "and with rollers running on cross tram rails in constructing "portable crossings, as shewn and described."

"Fifty-firstly, the application of the rails, and the chairs and "sleepers in which or to which they are affixed, when used in "combination with machinery or apparatus for preventing injury "or accidents on railways."

"Fifty-secondly, the improved clips or slides, when used in the "manner and for the purpose described."

"Fifty-thirdly, the mode of applying rollers to the rails of "railways."

"Fifty-fourthly, the application of rollers and fenders or guards "to the wheels of railway carriages."

"And, lastly, the improved combination of machinery for bringing the clips or slides in contact with the rails."

[Printed, 21*s.* 10*d.* Drawings.]

A.D. 1860, January 28.—N° 222.

JOHNSON, John Henry.—(*A communication from Francois Auguste Dufey.*)—"Improvements in the steeling and cementation of metals."

"In a simple and economic mode of steeling or cementing metals, and of improving the quality of inferior steel, and effecting such processes by the vapourization resulting from the boiling of a combination of animal, vegetable, and mineral substances, into which vapour the metal to be treated is to be immersed. This vapourization is prepared by combining the following ingredients in the following proportions:—

Grease	500	parts by weight.
Oil	500	,,
Charcoal	350	,,
Prussiate	250	,,
Horn	330	,,
Saltpetre	300	,,

"By the above mixture the cementation of cast iron of all kinds may be obtained in a few minutes. The same system is equally applicable to the hardening of various parts of machinery or tools, whether of wrought or cast iron, and to the hardening of the rails of railways, and the wheels, springs, and other portions of the rolling stock."

[Expired 3rd year. Printed, 4*d.* No Drawings.]

A.D. 1860, February 8.—N° 334.

MOODY, Charles Peters.—(*Provisional protection only.*)—"Improvements in carrying, supporting, and shifting engines used in ploughing and other agricultural operations, and in apparatus employed therein."

The patentee says:—"At both ends of a field over which an engine is to draw at its side ploughs or other implements, I lay down a platform along which the sleepers and rails for supporting the engine are to be drawn or traversed. The platform itself is drawn along after the engine has left the rails, which it supports by winding up a rope attached to an anchor, or other-

" wise. Between the two traversing platforms I lay down a portable railway. I either shift each length separately laterally across the field, or I move the whole railway or three or more lengths when joined together, by the following contrivance:— To the two lengths farthest from the centre I connect one end of two cords, and I lead each of the cords through a pulley supported by an anchor placed for the purpose. I carry on the cords through a block secured and held in place by another anchor in which there are two pulleys; each of the cords is passed round one of the pulleys, and both cords are carried back towards the apparatus. They may be united in one, or may be carried on together, and attached to the barrel of a windlass projecting from the side framing of the railway about the centre. On power being applied to turn the windlass, all the parts connected as aforesaid, and to which the cords are attached, will simultaneously and as one body be drawn laterally."

[Printed, 4*d*. No Drawings.]

A.D. 1860, February 8.—N° 343.

NEWTON, William Edward.—(*A communication from George Millard Reed Bayley.*)—" Improvements in rails, rail supports, and fastenings, and the nut fastenings of rail bolts for the permanent way of railroads."

First, in a peculiar formed reversible rail, called the reversible **Z** rail; with this rail is combined the double-headed, with the flat-footed one side and double-headed the other side.

Second, in supporting, bracing, and giving an artificial bearing to railway rails, particularly the **Z** rail, at the intermediate cross ties between the joints, or at the joints themselves, so as to obtain at such points on the cross ties any desired width of rail base, without adding to the weight of the rail, and without using bolts.

Third, in a novel method of securing the joints of rails by brackets and fishing bars, and at the same time securing the brackets and fishing bars down firmly to the sleepers, dispensing with the ordinary screw bolts, while the parts forming the rail will be rendered more substantial and less liable to injury or to come loose by the passing of the trains over the rail.

Fourth, in a novel method of securing the rail joints by bolts, and in preventing them from working loose in consequence of the passing of the trains. For effecting this a suitable wedge or nut guard is employed, which, when these nuts are tightened up is placed under them in such a manner as to form a perfect lock, and prevent them from getting loose by the passing of the train over the rail.

Fifth, in forming a rail spike head of a peculiar shape, having in the back a supplementary lip for allowing the insertion under it of an edged crowbar for drawing out the spike, the head being so formed that it will keep the nut guards in place and securely lock them under the nuts of the rail bolts where nut bolts are used, and so that the head of the spikes will fit bevelled-shaped recesses in the nut fastenings, and not only keep them in place but prevent them from tilting or moving.

[Expired 3rd year. Printed, 2*s*. Drawings.]

A.D. 1860, February 10.—N° 356.

RAMMELL, Thomas Webster.—" Improvements in pneu-" matic railways and tubes."

" This invention is for an improved pneumatic railway pecu-" liarly adapted for underground communication in large towns, " but which may be applied above ground, and be used even for " country lines. The railway is placed in a hollow way or tunnel, " which may be of any shape, but will be most conveniently made " of the same shape in transverse section as the carriages em-" ployed, and in size very little larger than such carriages. The " carriages are entirely supported, and in their motion directed by " the iron rails, grooves, or trams constituting the way. The " carriage underneath is boxed or framed out in one or more " places to the shape and nearly to the size of the tunnel, and the " same contrivance must be adopted in cases where the body of " the carriage is not of the same shape and nearly of the same " size as the tunnel. A soft material is introduced to fill up the " narrow space left between the carriages and the casing of the " tunnel, and is affixed to and moves along with one or more of " the carriages, by which means leakage of air is in great measure " prevented during the working, or in cases where the leakage is " inconsiderable this may be dispensed with. The pneumatic " pressure is applied over the entire transverse area of the car-" riages, either by exhaustion or compression, the pumps or other " apparatus for the purpose being worked by steam power, and

“ proper valves and air passages being provided. For the exhaustion or compression of the air I prefer to use the pump on “ the principle of the screw or fan.

“ A railway may be either single or double, each line having its “ own tunnel or hollow way, and may consist of one section only “ or of many sections, which may be worked concertedly, so as to “ pass the traffic on from end to end, with stoppages for taking “ up and setting down at every station. The railways may be “ used for the conveyance of passengers or goods, or upon a “ smaller scale of any size desired, for the conveyance of parcels “ letters, and the like through a tube, in which case the rails or “ grooves guiding and directing the motion of the carriage may “ or may not be part of the body of the tube, as desired.”

[Expired 3rd year. Printed, 10*d.* Drawing.]

A.D. 1860, February 11.—N° 377.

NEWTON, Alfred Vincent.—(*A communication from George Smith Avery.*)—“ An improved construction of joints for railway “ bars or rails.”

“ The construction of the joints by offsetting or bending the “ end of one rail, and lapping the end of the next one alongside “ of it as far as it is offset, and riveting or bolting the two lapping “ portions together, with or without a key of wood or iron, in “ the space between the necks of the rails where they are lapped.”

[Printed, 6*d.* Drawing.]

A.D. 1860, February 23.—N° 487.

BARLOW, Thomas.—(*Provisional protection only.*)—“ A new “ or improved rail for railways.”

“ On either side of the body, and midway between the two “ heads of the rail, is a flange running the whole length of the “ rail. In laying this rail, the said flanges are placed upon “ sleepers situated on either side the line of rail, the said “ flanges being secured to the sleepers by bolts or otherwise; “ when one of the heads of the rail is worn, the rail is turned so “ as to bring the other head into use. As the rail is supported “ on the flanges the height of the rail when turned is not affected “ by the worn head of the rail which is undermost.”

[Printed, 4*d.* No Drawings.]

A.D. 1860, March 8.—N° 628.

GODDARD, William.—(*Provisional protection only.*)—" An " improvement in railway chairs."

" The chair is cast in two parts, the outer jaw and base being " in one piece, and the inside jaw loose, and fastened to the other " part by a bolt with a square neck and snap head passing through " the rail and both jaws of the chair, and is steadied by a lug at " the bottom of it, which fits into the base of the chair, and forms " a shoulder or abutment. The rail is suspended on the top of " the chair, which fits to the under side of the top flange of the " rail, and also by means of the bolt. The bottom flange of the " rail by this combination is prevented from coming in contact " with the base of the chair, and the rail can be reversed."

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 13.—N° 671.

NEWTON, William Edward.—(*A communication from Wharton William.*) — " Improvements in railway tracks and carriage " wheels."

The object of this invention of improvements in railway tracks and carriage wheels is to allow one or more of a series of trains that run over a common railway to pass the switches or other appliances that may be used at the intersections of branch ways with the common or main railway without being interfered with or turned out of their proper way by such switches.

To arrange at the crossings or intersections on railways a switch, turn-out, or appliance in such a way that each train, although allowed without interference to pass the switches, turn-outs, or other appliances at the intersections of the branch way without the aid of switches or any appliance requiring manual adjustment at such crossing, but will be switched or turned out of the main line into its proper branch when it arrives there.

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1860, March 15.—N° 690.

LAUTH, Bernard.—(*A communication from John Fritz.*)—(*Provisional protection only.*) — " Improvements in machinery or ap- " paratus for rolling railroad rails, bars, beams, and other such " articles."

" In so arranging three high rolls that the article shall be sub-

" jected to the rolls in each of its passes to and fro, and so that " each pass shall roll down the pin formed at the preceding pass, " and avoid the turning of the rail, bar, or beam."

" And, in combining with the top roll of the series, or with the " roll that performs its part of the operation, elastic or yielding " guides, or their equivalents, for causing the bar, beam, or rail " to pass from the said roll, and not wind around it."

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 16.—N° 696.

SAYER, Robert Burges. — " Improvements in parts of the " permanent way of railways."

The patentee says:—" I propose to make railway chairs (adapted " for joint and intermediate chairing on railways constructed " with cross sleepers and double or single tee-headed rails."

" My chairs will be made in two parts, tongued together with " circular joints and keyed together in the bottom thereof with " plates of wrought iron. The inside end of plate will have an " inclined plane, and snugs will be made on the bottom of the " chairs, fitting into slots in the bottom plate, so that the fang " bolt fastenings will alone draw the whole together perfectly " rigid and firm, dispensing with the use of keys, plugs, or other " fastenings."

" I propose to make the joint chairs with a cross fillet cast in " the centre of the chair, which will form a perfect fish joint. " The rails will be supported on the bottom and under the top " head of the rail by the chairs."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1860, March 20.—N° 727.

FINCH, Edward.—(*Provisional protection only.*)—" Improve- " ments in constructing railway switches and crossings."

" This invention is applicable to railways constructed across or " along roads and ways where carriages with wheels having " ordinary tyres are used, and are required to be allowed to pass " freely across such railway. For these purposes, where the rails " used in constructing the railway are hollow, and somewhat " similar in section to inverted 'bridge rails,' and where the " flanges of the railway carriages run in the hollows or grooves of " the rails, and in applying in combination with such inverted or

" hollow rails, switches and crossings constructed in like manner " to the switches and crossings on broad guage and other rail- " ways, where bridge rails are used in constructing the permanent " ways."

[Printed, 4*d*. No Drawings.]

A.D. 1860, April 20.—N° 990.

ROBERT, Richard.—" Improvements in punching machines."

" In certain improved combinations of eccentrics or other " equivalent agents, with dies and punches for punching, either " simultaneously or otherwise, both webs of L, T, and other " shaped bars of iron or other metal; and also in the application " of self-acting mechanism for advancing the said bars previous " to and for holding them whilst being punched, whereby greater " accuracy will be attained than is practicable by the present " methods.

" The instrument by which the angle or other shaped bar to be " punched is held down during the operation of punching, is " worked by a cam acting on the weighted lever or other suitable " mechanism, previous to advancing the carriage or carriages to " which the bar under operation is secured. The mechanism for " advancing the carriage or carriages and bar on rails consists of " a toothed rack, connected to the carriage, acted upon at each " stroke of the machine by a pall or click, actuated by a cam or " other equivalent agent."

[Expired 3rd year. Printed, 4*d*. Drawings.]

A.D. 1860, April 20.—N° 997.

WALKER, James.—(*Provisional protection only.*)—" Improvements in railway sleepers."

" These improvements consist in making the sleepers for rail- " ways of plates of wrought or cast iron, bolted or rivetted to " a stretcher piece of angle or T iron, or iron of other suitable " section."

[Printed, 4*d*. No Drawings.]

A.D. 1860, April 21.—N° 1006.

WALKER, James.—(*Provisional protection only.*)—" Improve- " ments in railway points or switches, and also in the keys for " securing the rails in chairs of railways."

" The improvements in points or switches consist in avoiding " the tapering of the tongue rail, using an ordinary parallel-sided " rail, and making a portion of the side rail moveable.

" The improvements in keys for securing the rails in the chairs " consists in making them either of iron or wood, but of such " thickness as to admit of the key being dropped in between the " upper flange of the rail and the jaw of the chair, a projection or " lug being formed on each end of the key, so as to prevent it " from moving endways when placed in the chair. One or more " iron or wooden wedges or packings are then to be driven in a " vertical direction between the key and the jaw of the chair, so " as to secure the whole.

" As a modification of the above, the projections on the keys " may be made only sufficiently large to clip the wedge, in which " case the wedges must be formed with projections so as to clip " the chair.

[Printed, 6*d*. No Drawings.]

A.D. 1860, April 24.—N° 1022.

GATWOOD, Edward.—" Improvements in fixing and securing " the rails in cast-iron or other chairs at joints and intermediate " places in permanent ways."

" In securing the rails at the joints, by a plate of cast or " wrought iron of sufficient length to take the ends of both rails, " and made to fit any section of rail on one side, the other side of " the plate to have one or more recesses. A wood or any other " key is placed, with a projection, to fit in this recess or recesses; " this key on the opposite side must have a groove or notch to " take the projecting part of an iron or any other wedge driven in " between the wood key and the jaw of the chair, to prevent the " iron plate and wood key from working out or getting loose, " and to accomplish this, when the iron wedge is driven in sufficiently tight, the end must be bent back against the side of the " chair and fixed."

[Expired 3rd year. Printed, 10*d*. Drawing.]

A.D. 1860, April 25.—N° 1040.

TARTE, Xavier, and TOOVEY, William.—" Improvements " in the construction of floorings and roofings, and other parts

" of buildings and other structures, which improvements are " also applicable to the construction of bridges and other " works."

" The object is to obtain lightness and strength in the con- " struction of parts of buildings and other structures, and to " render such parts fireproof." " For these purposes, light " framings are formed of wrought metal, which are covered on " the upper and lower sides with plates of sheet metal, the whole " being united together by suitable bolts. When for floorings, " the upper surface of these constructions may be covered with " wood or any other suitable material, and the under surface with " lath and plaster to form a ceiling."

" Sometimes the surfaces are formed by means of plates laid in " angular channels, and connected together across the upper and " lower angles by transverse straps or plates, or by the aid of " blocks of wood when for roofing."

The patentee says:—" The system described can be applied in " the most advantageous manner not only to ordinary buildings, " but to foundations of all works, as platforms or coffer dams, " to the construction of bridges; to hydraulic works, as ground " frames; to syphons; to vaults, arches for roofs of churches, " and all public edifices of whatever form; to the construction of " tunnels; and to railways, viaducts, &c."

" It presents in these divers constructions five conditions which " are rarely united, vizt., solidity, economy, elegance, a prompt " execution, and public and private safety."

[Expired 3rd year. Printed, 1*s.* 6*d.* Drawings.]

A.D. 1860, April 26.—N° 1051.

TRAIN, George Francis.—" Improved system of railway or " tramway to be used with horses or other power, and passenger " carriages for the same."

The rails used in the construction of the road being so shaped as to form both a tramway and railway, upon which the ordinary wheels of common vehicles, or the flanched wheels of railway carriages can travel, and is peculiarly well adapted for laying down in streets and common highways. And in a novel construction of vehicles for the conveyance of passengers over the said roadway.

The improved form of rail intended to be used in the construction of the combined tramway and railway is preferred of rolled iron bars of any convenient length, and say from three to six inches broad, the upper surface of which are formed on the outer side with a ridge of from about half an inch to one inch elevation, with a flat or slightly rounded crown of about one and a half inches broad, and which is vertical on the outside, and worked off into a round and hollow in the inner side, leaving a lower flat or nearly flat surface of from one and a half to two and three-quarters inches wide. The under surface of the rail I form with a feather or flanch on each side, to assist in keeping it in position on the longitudinal stringers of timber upon which they are to be laid. The rails are secured to the longitudinal stringers upon which they are laid by spikes or bolts, the heads of which are countersunk in the upper surface of the thin flat part of the rail. The stringers are kept parallel to each other by the use of transverse wood sleepers or iron tie rods, as is well understood.

[Printed, 8*d*. Drawings.]

A.D. 1860, April 30.—N° 1085.

MASURE, George.—"Improvements in the construction of "railway crossings."

Constructing and arranging this part of the permanent way so that there may be no danger of a through tram being thrown off, or improperly diverted from the line at points where such improved crossings are placed. With my improved crossing the through line is not in any way interfered with or divided, as is now the case, in order to enable the flanges of the wheels of the carriages to pass across the main line, to do which, according to the present system, the rails of the line must be divided at different places, and thereby weakened, and the continuity of the line destroyed. Instead of this the rails of the crossing are made higher than the main rails at all points where they cross the main line, so that a flanged wheel in passing over the crossing, will be raised up above the main line, and the flange will be allowed to pass over the same. This is effected by making the rails of the crossing on an incline up to the main line, then giving them an inclination in the opposite direction after passing over the main line until they arrive at a proper level.

[Printed, 8*d*. Drawings.]

A.D. 1860, April 30.—N° 1091.

HUGHES, EDWARD THOMAS.—"Improvements in joining or "connecting rails for railways."

"In joining the ends of the rails together without splits or "fish joints, by forming each end with a tenon or wedge, and "also with a mortice or groove, the projection on one end of the "rail fitting into the mortice or groove in the next or following "rail."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1860, May 9.—N° 1142.

KEMP, HENRY.—"Improvements in preserving wood, leather, "iron, and other substances."

"In the application of certain materials in combination to "them, with a view to their preservation from the attack of barnacles and all kinds of vegetable or animal life, or from corrosion "or natural decay."

"As regards the preservation of wood generally, as timber for "buildings, bridges, railway sleepers, and various other purposes, "take equal proportions of peat tar and wood tar, and add in "proportions peat oil and methylated spirit, and also in some "cases sulphate of iron, and arsenic is lastly added, sufficient to "poison the mass so as to render the composition destructive to "animal and vegetable life."

[Expired 3rd year. Printed, 4*d*. No Drawings.]

A.D. 1860, May 29.—N° 1324.

HEINDRYCKX, FLORIDE.—"Improvements in the construc"tion of railway chairs."

To construct railway chairs in such a manner as to enable engineers to dispense with the use of the wooden quoins or wedges which are usually employed for securing the rails in their chairs.

Another advantage arising from the adoption of the present improvements is, that wrought iron chairs of the form required may be easily and cheaply made or produced.

A permanent way constructed and arranged on my new plan will also be more simple and much stronger, and more easily repaired than those constructed in the usual manner. The chairs are made from bar iron or steel, bent up in a suitable manner to form a lateral abutment for the side of the rail to fit or bear against, while the footing of the rail rests upon the horizontal part of the chair. The chair is secured down to wooden or other cross sleepers by means of bolts or spikes in the ordinary manner; or two of my improved chairs may be formed on the ends of one bar of iron or steel, which, when properly secured to the ground, will ensure the maintenance of the guage at its original accuracy.

[Expired 3rd year. Printed, 6*d*. Drawings.]

A.D. 1860, June 8.—N° 1414.

MONKS, JAMES.—(*Provisional protection only.*) — " Improve-
" ments in the rails and chairs of railways."

The railway chairs are formed of two parts one half being on each side of the rail, and draw and hold the parts together by a through bolt or bolts, and thus grip and hold the rail firmly in position. A tongue is formed on the one half of the chair which enters a recess in the other half and binds therein; the feet or soles of these half chairs are bolted down on the sleepers, the one part as a fixture and the other half having slot holes, through which its holding down bolts pass to prevent its sliding towards or from the rail. The rail consists of what is termed a double bridge rail, being hollow, and somewhat of a rectangular form in its cross section, having midway of its depth flanges or ribs on which it rests and is gripped by the improved chair; it may also rest on the lower part. These rails are made with butt or lapped joints; the lap may be midway of the depth or thickness of the flange, or with the flange altogether on one part.

[Printed, 4*d*. Drawings.]

A.D. 1860, June 1.—N° 1513.

BUCKWELL, WILLIAM.—(*Provisional protection only.*)—" Im-
" provements in moulding blocks, slabs, pipes, and other articles,
" and in the apparatus to be employed therein."

" In making such blocks hollow by the insertion of a core or
" cores in the mould box, and in adapting them for supporting
" the rails of railways. To this end a strong cast iron mould is
" formed with two hexagonal chambers, and in each is inserted a
" triangular metal case, which is rounded at the angles, and has

" fitting against its sides three radial plates which meet three " angles of the chamber and thus each chamber is divided into " three compartments. The blocks produced in this mould will " have for their base two sides of the hexagon, and for their " upper part inclined sides and a recess capable of receiving a " rail and suitable wedges or elastic bearings or filling pieces " for holding it in suspension."

[Printed, 4*d.* No Drawings.]

A.D. 1860, June 23.—N° 1527.

RAMSBOTTOM, John. — " Improvements in supplying the " tenders or tanks of locomotive engines with water."

" This invention relates to a peculiar system or mode of supplying the tenders or tanks of railway locomotive engines with " water without requiring the stoppage of the train, and consists " in the employment of a trough or long tank laid longitudinally " between or alongside the rails of the permanent way, which " trough contains the water which is to supply the tender or " tank. The water is conveyed from this trough to the tender " or engine tank by means of a dip pipe connected with such " tender or tank and curved slightly forward at its lower end, " so that, as the train is passing along it will cause the water " to be forced up the pipe into the tender or engine tank. For " low speeds the dip pipe may open into the bottom of the " tender or engine tank and should then be provided with an " ordinary clack valve open upwards to prevent the return of " the water, but in the case of high speeds the dip pipe may " open into the tender or engine tank above the top water level, " in which case the clack valve may be dispensed with."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, July 3.—N° 1609.

MORRIS, James.—" An improved key for securing railway " rails."

According to this invention keys or wedges for securing railway rails are constructed in the following manner:—They are made principally of metal, and shaped so as to fit between the cheek of the chairs of whatever description, and the web of the rail partly filling up the space between the flanges of the rail. On the side which when the key or wedge is in use is towards the rail a recess is made, and into this recess a small piece of wood on the flat of the grain is fitted so as to project slightly beyond the surface of the key or wedge; thus when the key or wedge is driven into its place the surface of the wooden filling piece will bear against the webb of the rail. Keys thus constructed hold more securely and are more durable than wooden keys, and at the same time they have not the regidity of a key made entirely of metal; they are much less liable to be broken or become loose by the vibration of trains passing over them, which is the great objection to keys made entirely of metal. The small piece of wood is also completely protected from exposure to the weather and is not affected by either heat or wet, so as to shrink or swell.

[Printed, 6*d.* Drawing.]

A.D. 1860, July 9.—Nº 1652.

HEINDRYCKX, Floride. — (*Provisional protection only.*)— " Improvements in the construction of the permanent way of " railways."

" One object is to dispense with the use of separate chairs for " supporting the rails, and to secure the latter to convenient " lengths of angle iron, which when arranged and secured will " form longitudinal sleepers with a bearing surface of greater " extent than the sleepers usually employed."

" In carrying this out, a T-shaped rail is employed, the vertical " web of which is enclosed between the vertical flanges of two " bars of angle iron. The parts are secured together by means of " screw bolts and nuts, and the bearing plates of angle iron are " arranged in such a manner that the ends of the pairs of plates " are made to break joint, so that the extremities of no two plates " on one side of the rail shall ever come opposite to a similar " joint on the opposite side of the rail."

[Printed, 4*d.* No Drawings.]

A.D. 1860, July 14.—Nº 1699.

PILE, John, and SMYTH, John Robert.—" Improvements " in the preservation of iron surfaces from corrosion or decay."

" The application and use of a peculiar composition and enamel " for protecting iron and other surfaces from corrosion and decay " and specially applicable for the preservation of the surface of " iron ships, buoys, reservoirs, gas, water, and other metal pipes.

" Also to the preservation of wooden surfaces, railway sleepers, " piles, wooden buoys, and the wooden foundations of piers and " other structures.

" Over this coating, when dry, we next apply a coating of com- " posite enamel, consisting of the following ingredients in the " following proportions, which proportions may, however, be " varied more or less, but a good effect will be obtained from those " given below :—Take of black pitch, resin, asphalt, or any pitchy " or bituminous substance equal parts by weight, and add thereto, " say, twenty pounds of coal tar or oil to every one hundred and " twelve pounds of enamel."

[Expired 3rd year. Printed, 4*d*. No Drawings.]

A.D. 1860, July 19.—N° 1754.

SAXBY, JOHN.—" Improvements in apparatus for, and the " mode or method of working and governing railway points and " signals."

The present invention is to put it out of the power of the signalman to give a contradictory signal, and out of the power of the pointsman to have the points contradicting the signals, or the points contradicting each other, by which a train may be turned on to a road upon which it was not intended it should go, and thus, notwithstanding the number or complexity of the points and signals in connection therewith, the working of such points and signals is rendered perfectly simple and free from error or confusion.

[Printed, 1*s*. Drawings.]

A.D. 1860, July 24.—N° 1782.

JONES, HENRY.—(*Provisional protection only.*)—" Improve- " ments in rails for railways."

" In forming the rails in two parts, whereof the under part is " fixed to the ordinary sleepers, and the upper part is inserted in " the said lower part, and fixed therein by bolts or otherwise. " For this purpose the upper part of the rail is formed with a " tongue, which is capable of fitting into a deep groove in the " lower part thereof, the bolts or other fastenings being passed " through the two jaws or sides of the said groove, and through " the tongue of the upper part of the rail. The two parts of the " rail are arranged so as to break joint, thereby dispensing with

" the necessity of a fish joint. The lower part of the rail is " intended to be permanently fixed to the ordinary sleepers " or bearers for the rail, and the upper part is removeable by " merely withdrawing the bolts or fastenings.

" By this arrangement the lower part of the rail is intended to " remain as fixed, the upper part alone being changed as required " in consequence of its wear."

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 25.—N° 1798.

KINGSLEY, JEFFRIES.—(*Provisional protection only.*)—" Im- " provements in railways and in carriages to be used thereon."

" In arrangements to enable mails to be conveyed with greater " certainty, a carriage being stationed in front or in the rear of " the mail train, so that in cases of accident it may proceed to the " next station house, from whence a locomotive may be despatched " to the van, off which the post-office guard and the mail bags " may be transferred."

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 2.—N° 1864.

RYDE, JOHN.—(*Provisional protection only.*)—(*A communication from Frédéric Paul.*)—" An improvement in apparatus applicable " to turntables, swing bridges, cranes, and other machinery acting " on a pivot."

" In replacing by a pivot with ball and socket, the pivots and " rollers hitherto applied to turntables of railways, swing bridges, " cranes, and to every kind of apparatus moving on pivots by a " very extensive circular plate, and thereby to diminish the " resistance of all the above-named apparatus."

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 3.—N° 1879.

HIGGIN, JAMES. — " Improvements in railways, in railway " carriages, and in the mode of retarding and stopping railway " carriages."

" In making rails of strong angle iron, bolted or otherwise " attached to longitudinal sleepers. In making wheels without " flanges, and of much greater diameters than before used, and " constructing the carriage so that its body may be about four

" inches above the rails; the part of the carriage immediately " over the rails is provided with plates of iron, with a projecting " flange at one or more parts fitting within the rails. These pro- " jecting flanges answer the purpose of the wheel flanges."

[Expired 3rd year. Printed, 10*d*. Drawings.]

A.D. 1860, August 3.—N° 1886.

STEPHENS, JOHN.—(*Provisional protection only.*)—" Improve- " ments in the arrangement of wheeled carriages to facilitate " their movement on soft or uneven land."

" In place of connecting the short rails or bearing blocks by " their ends, flexible connections " are used, " such as chains or " bands, to connect them together by their centres. By this " arrangement the chains or bands form a flexible endless chain, " which will pass freely around the wheel, and will carry the rails " or bearing blocks with it. The endless chain of blocks may " either rest on the wheel itself or may be supported on the " pulleys placed around the wheel. This arrangement also allows " the carriage or vehicle to which it is applied to turn much more " readily than it could, were the bearing blocks jointed end to " end. Flanges are placed at the sides of the bearing blocks in " order to prevent them slipping laterally out of their places as " they pass over the wheel. In order to assist in lifting the " bearing blocks out of a tenaceous soil, an incline is mounted on " an arm carried by the vehicle, which just as the bearing block " has to be raised comes against a pin or projection at the end " of it which is furthest from the wheel, and tilts it, after which " it is easily lifted as the wheel travels on. When the apparatus " is intended for very rough land, it is advisable, in place of con- " necting the bearing blocks by their centres, to connect them by " points intermediate between the centre and the end of each " block."

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 10.—N° 1941.

PLUM, THOMAS WILLIAM.—(*Provisional protection only.*)— " Improvements in fixing tyres upon wheels and chairs, upon " sleepers, part of which is applicable to rivetting generally."

" For the purpose of obtaining a more even and less detri- " mental action of the wheels upon rails by casting the ordinary

" chairs with the bolt holes at an angle instead of being perfectly " vertical, the bolts or spikes for fixing the chairs are conse- " quently driven into the sleepers skewwise, and do not so easily " draw by the action of the wheels upon them."

[Printed, 6*d.* Drawing.]

A.D. 1860, August 11.—N° 1944.

DE BERGUE, Charles. — (*Provisional protection only.*)— " Improvements in the permanent way of railways."

" In constructing the permanent way by laying the rails " directly upon the ballast, and obtaining additional width of " bearing by longitudinal metal side supports or sleepers, one on " each side of the rail, which are not directly fastened or secured " to the rail, but are connected therewith by means of cross " sleepers, bearers, or bars fastened to the rails and the longi- " tudinal sleepers. And in constructing permanent ways, with " the side sleepers so shaped and disposed as that the com- " binations of parts may present a trough-like section, so as to " obtain lateral steadiness by lying within the ballast."

" The cross sleepers are to or may consist of chair-shaped " pieces or plates, and it is intended to dispose the several parts " so as to break joint or bond with each other."

[Printed, 4*d.* No Drawings.]

A.D. 1860, August 14.—N° 1967.

FIELD, William, and JEFFREYS, Edward.—" Improve- " ments in the permanent way of railways."

" In connecting the abutting ends of the rails together, so as " to prevent their being moved vertically out of their places when " the rails become loose in their seat. To this end corresponding " notches are made in the butt ends of the rails, and in these " notches a pin or tongue piece is inserted, which being secured " in position, will prevent the ends of adjoining rails from rising " up or moving vertically."

[Expired 3rd year. Printed, 4*d.* No Drawings.]

A.D. 1860, August 15.—N° 1982.

SAMUEL, James, and TRAIN, George F.—" Improvements " in rails for streets and roads, and in wheels and axles to be used " thereon."

"The improvements in rails for streets and common roads consist in constructing them in such forms as will allow of their being reversed and used on the opposite side to that rendered unserviceable by wear."

[Expired 3rd year. Printed, 1*s*. Drawings.]

A.D. 1860, August 20.—N° 2008.

NEWTON, ALFRED VINCENT.—(*A communication from Joseph M. Heard.*)—(*Provisional protection only.*)—"An improved mode of coupling the rails of railways."

Exactly the same as in his Specification, A.D. 1861, N° 410.

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 21.—N° 2010.

GREAVES, HUGH.—(*Provisional protection only.*)—"Improvements in the construction of railways, tramways, or tracks for carriages, and in the appliances for the conveyance of passengers, parcels, and letters thereby."

"In employing surfaces or rails for the wheels of vehicles to run upon, combined with hollow longitudinal sleepers, in the interior of which are placed rails for the guidance of suitable carriages, in which I place parcels or letters, and which are caused to progress from station to station by means of ropes of suitable material, guided by rollers and sheaves, and actuated by steam engines or other suitable power, at such distances apart as may be found most convenient for the intended object. Apertures must be provided at each station for obtaining access to the carriages in the interior of the hollow sleepers, and for the withdrawal of parcels and letters conveyed therein. Where convenient and desirable it is proposed to lay down a tube of suitable material midway between the rails or trams, for the purpose of receiving a haulage rope of suitable material for hauling the carriages along the line of railway, suitable means being provided for attaching and detaching them with facility at the stations."

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 30.—N° 2096.

JOHNSON, JOHN HENRY.—(*A communication from James H. Swett.*)—"Improvements in the manufacture of railway chairs."

"In first rolling a bar or slab of wrought iron with two longi-
" tudinal ridges or ribs on one side thereof near its edges, one of
" such ridges being larger than the other, and containing suffi-
" cient metal to form the rail-holding jaw of the chair. This bar
" or slab is then passed vertical or edgewise between a pair of
" rolls which form the larger rib or ridge, into an overhanging lip
" extending from end to end of the bar or slab. This bar or slab
" so rolled is now sawn transversely into short lengths equal to
" the desired width of the chair, and a mandril of the size of the
" base of the rail to be fitted into the chair is slipped under the lip
" of each chair, and by the aid of a single blow from a fly press
" or steam hammer straightens the chair and shapes the lip, so
" that it will exactly fit the rail. The chairs may now have the
" spike holes formed in them, after which they are ready for use.
" If desired, two lips or jaws may be made by making both ridges
" or ribs of the same size, and giving the bar a greater curve,
" which curve may be subsequently taken out by hammering or
" by passing through a pair of vertical rolls, which receive it
" immediately on its leaving the cutting rolls."

[Printed, 6*d*. Drawing.]

A.D. 1860, August 31.—N° 2101.

MARTIN, Charles.—(*Provisional protection only.*)—" Improve-
" ments in the form and in the method of, and means for con-
" structing beams, joists, girders, and rails, and in the permanent
" way of railways generally."

" The rail is so formed that it shall have a triangular sectional
" outline, that is to say, that it shall have three radiating axes at
" angles of 120° to each other; symetrically round each of these
" axes is the web which terminates either in a T or bulb form,
" according to the particular application of the rail, or whether it
" is to be a joist, beam, girder, or rail; in like manner there may be
" one, two, or three of these bulbs or T terminations, as wished."

" Chairs are formed of a section similar in form to the lower
" or double portion of the rail, but with an enlarged bearing; a
" bolt and washer, or plate, or other suitable contrivance, covers
" the outer lips of the lower bulbs of the rail, and holds it firm
" in its seat. The chair may either be bolted on to a longitudinal
" corrugated iron sleeper, in width about equal to that of its
" bed, or the chair and its sleeper may be made all in one piece,

" so as to form a continuous bearing to the rail, and similar in " section to the chair and sleeper before described."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 5.—Nº 2141.

COOPER, John. — (*Provisional protection only.*)—" Improvements in railways, railway carriages, and apparatus connected " therewith."

" In an improved railway switch which moves down a smooth " incline into its place when the weight of a train is removed, a " weight attached to the point returns it back to the place whence " it started, leaving the main track or line of the railway open.

" Another improvement in switches consists in having the " points alternately to rise and to fall when moved by reverse " turning plates upon a shaft moved by a connecting rod and " balance weight. The rod is moved by a projection of an in- " verted V-form, above the height of the rail. This projection is " arranged to move upon a double-incline piston carrier slide, and " is acted on by an instrument passing down through the floor " of the locomotive, or tender, or other carriage; the extreme " point of the switch, when in place, will be exactly flush with " the rail."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 10.—Nº 2185.

ROBSON, William Evans.—(*Provisional protection only.*)— " The application of an improved elastic material for springs or " cushions on the chairs of railways and tramroads, or in any " other position to prevent the friction cansed by the working of " iron or iron or other metal substances."

" In confining an elastic material (without the aid of metal " plates) in the usual manner, with wedges to tighten the rails, " but the improved elastic material will be so protected from the " friction caused by the working of the rails, with the insertion of " fine brass or other wire (or similar substances) embedded, so as " to cause the material to be firmly rivetted together through the " meshes of wire or other material used, so that while it shall be " free to yield in a vertical direction it will be prevented from " pressing out laterally."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 25.—N° 2326.

HAWORTH, John.—"Improvements in tramways for streets " and ordinary roads, and in carriages for running thereon."

The improvements in carriages relate to those intended to run on tramways on rails similar to those above described, and consist in the application thereto of a pulley or wheel, or disc, the circumference of which runs in the groove in the intermediate rail, and is supported by a stud or axle connected by two diagonal stays or otherwise to the front axle, or other convenient part of the carriage. When the carriage is running along a straight or nearly straight road, the circumference of the wheel or disc is in the groove in the intermediate rail, and keeps the wheels of the carriage on the outer rails, but in turning a corner, or when it is otherwise necessary to deviate from the straight line, it is lifted out of the groove by a treadle or other apparatus, so as to set the carriage at liberty, and free to turn in any direction.

[Printed, 1*s*. Drawings.]

A.D. 1860, September 26.—N° 2336.

BURN, Charles.—"Improvements in the tramrails, or street " railways to prevent horses slipping thereon."

Longitudinal and transverse grooves are made in the surface of the tramrail, thus forming a number of projecting surfaces, which serve as a hold for the feet of the horses and prevent them from slipping.

[Printed, 10*d*. Drawings.]

A.D. 1860, September 26.—N° 2337.

BURN, Charles.—"An improved tramrail for street railways."

" In the construction of an iron rail or tramway in such a " manner that it may serve as a railway for vehicles with flanged " wheels, or as a tramway for vehicles having ordinary wheels. " Such construction combining the above purposes, and are called " tramrails, which may be laid down in the street of cities and " towns, highways, and thoroughfares, without offering any obstruction or impediment to the ordinary traffic.

" The upper surface of the tramrail is cast or rolled with one " or more longitudinal grooves made in it in the direction parallel " with the line of tramrail, and other transverse grooves made in

" it at right angles or with the longitudinal grooves, a portion of " the surface of the tramrail being for the purpose of forming a " railway for vehicles having flanged wheels, and the other " portion forming a tramway for vehicles having ordinary wheels.

" This iron tramrail is then laid upon a suitable foundation, " the upper surface being on a level with the surface of the street " or roadway in which it is laid."

[Printed, 1*s*. Drawings.]

A.D. 1860, October 8.—N° 2441.

JOHNSON, John Henry.—" Improvements in railways or " tramways, and in carriage wheels to be used thereon."

The said invention relates to a peculiar construction and arrangement of railways or tramways and carriage wheels intended to run thereon, whereby the carriages are rendered self transferring from the main line on to a siding or branch without the necessity of using turntables or moveable points. According to this invention it is proposed to make the points on those parts of the way where a siding or branch runs out of the main line, in such a manner as to remain always open whether for the through traffic on the main line or for the branch traffic, and in conjunction with these permanently open and fixed points is laid a guide rail, so disposed that by imparting a lateral thrust to the wheels of the carriage intended to be transferred to the siding or branch, those wheels will be caused to leave the main line and enter the branch line.

In carrying out this invention it is proposed to make those of the carriage to be transferred, and which are on the side of the line next to the guide rail, of a greater width than usual, so that as they pass the guide rail (which should stand higher up than the ordinary rail) they will be forced or pushed by it laterally into the branch, the flanges of the wheels passing through the open points. The guide rail may be placed either inside or outside of the line of rails, and the wheels to be acted upon by them may have annular projections or runs formed upon them, or special wheels for the guide rails to act upon may be employed. Those carriages which are not required to leave the main line are provided with ordinary railway wheels, and consequently they will not be acted upon by the guide rails, but will pass the points without leaving the main line.

[Printed, 8*d*. Drawing.]

A.D. 1860, October 9.—N° 2448.

STEVENS, Charles.—(*A communication from V. Clovis Simboiselle.*) — (*Provisional protection only.*) — " Improvements in " atmospheric railways."

" In causing the operation of rarefaction to be accomplished by " the conducting tube, which runs the whole length of the road " instead of by the propelling tube, as in the railways hitherto " constructed as in that of Saint Germain, which necessitates a " powerful fixed engine at certain distances, on account of the " entrance of the air, especially by longitudinal valve.

" The conducting tube is sunk to a depth of about 3 feet, the " whole length of the road; it is made of sheet iron, and com" municates with the propelling tube ever 10–900 yds. This tube " is covered with bituminous mastic, as is done with gas pipes, " and is arranged in the same manner. In certain cases, such as " crossing a river, the tube would necessarily be uncovered."

[Printed, 4*d*. No Drawings.]

A.D. 1860, October 15.—N° 2512.

BURN, Charles.—" Improvements in tramrails for street " railways."

This invention consists of certain improvements in the form and mode of supporting iron rails, for street railways, so that they may be adapted for vehicles having flanged wheels, and may be laid in streets of cities and on common roads, without causing any appreciable obstruction or inconvenience to the traffic of vehicles with ordinary wheels on the same road or street.

[Printed, 10*d*. Drawing.]

A.D. 1860, October 15.—N° 2513.

BURN, Charles.—" Improvements in the permanent way of " street railways."

This invention consists in improvements in the form, and mode of supporting iron rails, so that they may be laid along common roads and paved streets without impeding the ordinary traffic, and adapted for vehicles having flanged wheels.

[Printed, 1*s*. Drawings.]

A.D. 1860, October 16.—Nº 2519.

NEWTON, William Edward.—" An improved mode of con-
" structing railways."

The object of this invention is to construct the track of a railway as to give it a firm support without the use of wooden cross ties, and if thought desirable without the use of the stringers also. This plan is particularly suited to the construction of city railroads, as the laying of it necessitates very little displacement of earth or pavement, in which respect it has advantages over the known modes of construction. The chief feature of the invention consists in making the chairs which are now used only for holding the rails in place, also perform the office of sustaining the track. This is effected in so constructing the chairs that a portion of it is imbedded in the earth and forms a foundation for the track while the part which extends above the surface of the earth holds in place the rails as usual. That portion of the chair which is to be imbedded in the earth is made in the form of a screw or of a wedge-shaped pile. The upper part or head of the chair is provided with jaws or a recess for holding the rail as in the ordinary chair.

[Printed, 8*d*. Drawing.]

A.D. 1860, October 18.—Nº 2549.

BRUCE, George Barclay, and STEIN, Andrew. — (*Provisional protection only.*)—" Improvements in rail and tramways."

" The form of the rail and tramways may be varied, but it is pre-
" ferred that the rails should be formed of such cross sections
" that one part should form an edge rail suitable for flanched
" wheels to run on and another part should be flat or nearly so,
" and suitable for wheels having plain tyres to run on. This
" invention also relates to the form of switches used when con-
" structing rail and tramways, and consists in dispensing with
" the moveable tongues usually employed when constructing rail
" and tramways, and consists in dispensing with the moveable
" tongues usually employed when constructing rail and tramway
" switches, and at the same time so forming a switch that the
" flanches of the wheels will be caused to rise on and pass over
" the edge rail at the switch when passing from one line of rails
" on to another."

[Printed, 4*d*. No Drawings.]

A.D. 1860, October 27.—N° 2620.

HATHAWAY, CHARLES.—" Improvements in the construction " of street railways and in the wheels to run thereon."

To construct the rails or tramways either of cast or wrought iron and the working surfaces of the rails are made with double threads at different levels, one being intended for the flanged wheels of the street railway cars, and the other for the wheels of ordinary carriages. This compound rail when made of cast iron is cast in one piece, and has sockets and projections cast in or on the ends for the purpose of fitting into one another, and thereby preventing the rails from moving in a vertical direction. Sockets to receive keys or cottars are also cast on the sides of the rails to act as a further security. When this rail is made of wrought iron it will be found convenient to roll it in two parts, which are afterwards to be united laterally by means of bolts, rivets, or otherwise, so as to form the compound rail. These rails may be double headed, so that when one surface has been worn out, the rails may be turned over and present a fresh working surface. The working surfaces of the cast iron rail may be chilled in order to harden the same, and render them more durable. In joining the two parts of the rail together they should be made to break joint, and it is important also to notice that the flanges of the cars are made less than half an inch in depth, and that the difference in level of the two lines of tread in the compound rail is little more than one quarter of an inch; consequently ordinary carriages when obliged to cross the track will not be subjected to a severe shock as at present.

The turn-outs or switches are provided with fixed points so arranged, by one being placed a little in advance of the other, that they will always turn the carriage into the right-hand track at these points when going forward, but when the carriage is coming in the opposite direction it will be allowed to pass from the left-hand turn-out into the main line by passing over the points. These fixed points are made to act in this manner by being laid a little back from the straight line and in line with the turn-out track, which at these points are formed of curves of any convenient radius.

[Printed, 10*d*. Drawing.]

A.D. 1860, October 31.—N° 2660.

BULL, William.—" Improvements in the permanent way of " railways, and in connection therewith."

" In a double-headed rail reversible in the chairs, and fastened " therein by a wood key. The heads of which are made in the " form of the section of a horse's hoof, and the connecting rib is " formed nearly flush with the side."

" The chairs are single for intermediate bearers, and double and " tongued for the joints, obliquely angled, and secured to the " sleepers on a new principle of fastening, which is denominated " dovetail and wedge-spiking. This mode of fastening is also " applicable to right-angle chairs and flanged rails, for both " which it is also intended. The oblique angle principle is " adopted in forming the chairs, in order to obtain a broader " bearing, and at the same time to cause both spikes to traverse " the centre of the sleeper."

[Printed, 10*d*. Drawing.]

A.D. 1860, October 31.—N° 2666.

ANDERSON, James.—" Improvements in the manufacture of " felt, and in the mode of applying the same to railways and to " other uses."

The invention has for its objects the production and application of a fibrous waterproof material as a substitute for asphalte and other materials in their application to railway arches, platforms, floors, foundations, walks, and other purposes to which asphalte and like materials are ordinarily applied, whether of cotton, flax, hair, wool, or other substance, and combine various thicknesses of it in layers by means of tar or pitch, so as to form, when thus combined, a felt of considerable increased thickness and strength. Asphalte may be applied to the outside or other part of the consolidated felt, if thought desirable.

[Printed, 4*d*. No Drawings.]

A.D. 1860, November 10.—N° 2766.

DAFT, Thomas Barnabas, and POLE, William.—" Improvements in the fish joints of railways."

For these purposes between the screw nuts and the fish plates of fish joints of railways a metal washer is used suitable for embracing two or more screw bolts, and between such or single washers an elastic washer, by preference of vulcanized india-rubber, is introduced. By these means the elastic washers will tend to prevent the jar or vibration passing to the screw nuts, and at the same time the elastic pressure between the metal washer and the side of the fish plate will tend to prevent the screw nuts turning round on their screw bolts. The long metal washer will also have a beneficial action in preventing when screwing up of the nuts any prejudicial drag or action on the elastic washers, and such long washers will themselves also be more effective than single washers in preventing the screw nuts becoming loose.

[Printed, 6*d*. Drawing.]

A.D. 1860, November 10.—N° 2768.

WILSON, Edward Brown.—" Improvements in the manufac-" ture of railway wheels, tyres, axles, and points, and crossings, " which improvements are also applicable to the manufacture of " ordnance, tubes, and metal cylinders generally."

" In shaping and compressing such articles after they have " been cast or forged, by the aid of suitable dies acted upon by " hydrostatic pressure."

[Printed, 4*d*. No Drawings.]

A.D. 1860, November 20.—N° 2841.

MACNEILL, Thomas Telford.—" Improved means of obtain-" ing adhesion on railways for ascending inclines and other " purposes."

" The tyres of the driving wheels of the locomotive engine are " constructed with the flange and the adjoining part or 'tread' of " the ordinary form for running on the ordinary rails, the tyre is " made of an increased breadth, and a groove is formed in this " additional portion. At steep inclines, or wherever increased " adhesion is required an additional rail is fixed of round or " angular topped form on each side of the line. This rail slopes " up a little at its commencement, so that as the grooved part " of the tyre runs upon it the wheel is gradually raised until it " runs clear of the ordinary rail, and the weight of the driving " wheels and the load upon them is borne by the additional rails. " A greatly increased amount of adhesion is thus obtained, owing " to the wedge-like action of the rails and grooves, and the

" engine is thus enabled to draw greater loads up steeper inclines " than would otherwise be the case. The wheels of the carriage " continue to run on the ordinary rails."

[Printed, 10*d.* Drawing.]

A.D. 1860, November 23.—N° 2867.

DERING, George Edward. — " Improvements in the permanent way of railways."

In constructing the joints and various connections of parts of the permanent ways of railways, fastenings are made of steel, which are tempered, or of wrought iron, which are case or surface hardened, and they are applied to make and keep tight, by virtue of their elasticity, the various connections of the permanent way of a railway in place of or in addition to other fastenings now employed.

One method of making a suitable fastening for the connecting and holding together of two consecutive rails, consists of a clip, which partly embraces the ends of the two rails, passing underneath them, and the upper parts of such clip press upon the sides or upon the extended base of the two rails. These clips, if made of steel, are tempered, or if of wrought iron they are case or surface hardened, and by their elasticity the ends of the two rails are held securely in juxtaposition, an interval being allowed for the expansion of the rails if desirable.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, November 24.—N° 2890.

FOX, Samuel Mickle.—" Improvements in rails for railways, " and in the wheels of carriages to run thereon, especially adapted " to street railways."

" A grooved rail is used as a guide rail for the cars, and a flat " rail for the outer wheel, so that by placing the two grooved " guiding rails as near as convenient to each other in the centre " of the street, and the flat rails on the outer sides of the track, " there is no obstruction to other vehicles, because the flat rails " can be travelled on as well as any blocks of paving stones, while " the grooved rails near the centre of the street are out of the " the way of the respective lines of travel up one side and down " the other of the street, and occupy but about two feet instead

" of about fourteen feet as now used for the tracks; and these " grooved rails are no inconvenience in crossing, because a " vehicle would at the centre part of the street pass over these " rails nearly at right angles, or at a sufficient angle to be un- " injured, and the groove is too narrow to admit the tires."

[Printed, 6*d*. Drawings.]

A.D. 1860, November 26.—N° 2894.

TRAIN, GEORGE FRANCIS.—(*A communication from Musgrove, Ralph N.*)—" Improvements applicable to street railway carriages, " part of which are suitable for other purposes."

" This invention consists in part of an improved rail clearer, " one to be carried in front of each of the leading wheels of rail- " way cars, for removing stones or other obstructions. This rail " clearer consists of a piece of metal or other suitable substance, " having the under side thereof formed to coincide with contour " of the section of the rails, and at the front pointed vertically, so " as to cause it to remove obstructions either to one side or the " other of the rails. The rail clearers are mounted on suitable " arms projecting from the carriage frame, and are carried imme- " diately above and in close proximity to the rails, a little in " advance of the leading wheels."

[Printed, 7*d*. Drawings.]

A.D. 1860, December 1.—N° 2946.

GREAVES, HUGH.—" Improvements in the construction of rail- " ways, tramways, and in vehicles to run thereon, portions of " which improvements are applicable to other useful purposes."

" In the combination of a flush rail of fixed guage with a " cellular or reticulated cast-iron tramplate, for the purpose of " accommodating the traffic of vehicles of varied guage of wheels, " and thus combining the advantage of the edge rail with those " of the tramplate.

" Sleepers are employed, they are prepared in the form of " pipes, through which fluids or gases may be conveyed, thus " uniting strength and utility, and forming an unyielding road.

" Rails are employed of ordinary form in combination with " longitudinal sleepers of timber, secured thereto by clamps and " bolts, the bolts passing beneath and not through to the rail."

[Printed, 8*d*. Drawings.]

A.D. 1860, December 1.—N° 2950.

TIZARD, WILLIAM LITTELL.—" Improvements in fastening " threaded nuts and bolts."

" In the employment of a washer, one side of which is ex- " tended, and has the edges turned down over the 'fish plate,' a " slide is made in the washer parallel with one of the sides of the " nut, and another slit so as to form a tongue. After the nut is " screwed up the tongue is turned up, and thus the nut is pre- " vented from turning."

[Printed, 6*d*. Drawing.]

A.D. 1860, December 11.—N° 3043.

PYM, JOHN.—(*Provisional protection only.*)—" Improvements in " railway sleepers."

" By forming a longitudinal groove in the under side of a " wooden sleeper, and placing under it a piece of perforated metal, " or attaching to the sleeper a pipe or piece of curved metal " perforated at the sides to admit of the water absorbed by the " ballast passing into the cavity so formed, and flowing out at " the ends, thus forming a drain pipe under each sleeper, which " prevents the accumulation of water around the sleeper, and 'the " 'sopping' so prejudicial to the permanent way."

[Printed, 4*d*. No Drawings.]

A.D. 1860, December 19.—N° 3115.

McGANTEY, JAMES WILLIAM.—(*Provisional protection only.*) —" Improvements in means or apparatus for preventing collisions " on railways."

" By shutting off the steam while the locomotive engine is in " motion, not by any connection with or, direction given to those " on the engine or in the train, but by means of an inclined plane, " inclined planes, or other suitable contrivances placed between, " on, or near the rails of the railway, and acting upon other ma- " chinery or apparatus attached to the locomotive engine cuts off " the steam as the locomotive engine passes said inclined plane " inclined planes, or other suitable contrivances."

[Printed, 6*d*. No Drawings.]

A.D. 1860, December 20.—N° 3125.

FOURNIER, Amédie Benoit.—(*Provisional protection only.*)—"Preventing accidents on railways."

The invention consists of a lever combined for preventing the collision of locomotives coming or going to meet one another, in a straight line, in a curved line, or when many lines traverse the one and the other. This system consists in a little apparatus supporting the levers, as mentioned above, placed on the way at a distance of 1,130 yards one from the other, but communicating with each other in every 2,200 yards, and by that means forewarning any locomotive which is within the distance of 2,200 yards, either before or behind. Supposing some carriages become detached on the line, and a train coming before or behind is obliged to stop, the engine driver who is warned of the approach of a train by the apparatus, which shuts off the steam and which gives an alarm by whistling. By these precautions it would be impossible for any accident to happen. This system possesses also a great advantage in suppressing the use of signals.

[Printed, 4*d*. No Drawings.]

A.D. 1860, December 27.—N° 3171.

GUERRÉE, Toussaint Victor.—(*Provisional protection only.*)—"An apparatus for moving waggons or carriages on railways."

It consists of a frame placed on wheels running on the rails provided with a platform for an attendant to stand upon, and with a winch handle for giving motion to a worm or endless screw, in gear with a worm wheel upon the axle of the railway wheels. The top of the frame engine in a hook on the carriage to be moved. The wheels may be roughed or jagged to give them a better hol on the rails, and the bite may be further secured by means of a rod carried from the top of the frame to an excentric on the axle of the wheels.

[Printed, 4*d*. No Drawings.]

1861.

A.D. 1861, January 3.—N° 14.

FULLER, William Coles, JAQUES, James Archibald, and FANSHAWE, John Americus.—"Improvements in the

" adaptation of india-rubber and analogous gums and compounds thereof to valves, pumps, buckets, packing, and other parts of steam, water, air, and gas engines and apparatus."

"For stop valves used by plumbers and engineers in certain parts of water, steam, and other apparatus, we form a disc of hard rubber, with a thin surface of the elastic material united thereto. Such valves may be moulded separately, or cut out from junction sheet rubber prepared for that purpose. Air valves for pneumatic railways, for hot blast furnaces, for the ventilation of mines, and similar purposes where heat and other atmospheric changes are injurious to leather, may be constructed of junction rubber, and will be found both effective and durable."

[Printed, 8*d*. Drawing.]

A.D. 1861, January 10.—N° 68.

LONGMAID, WILLIAM. — "Improvements in hardening the surface of the rails of railways, and the surfaces of the tyres of railway wheels, and in charring the surfaces of timber to be used for railway sleepers and other purposes."

"For these purposes the rails and the tyres of wheels, after they have been formed in the usual manner, are packed in a suitable chamber with peat, or wood sawdust, or other vegetable matter, previously saturated or not with dilute sulphuric acid, so that the peat is in contact with the surfaces to be hardened; the chamber is then closed so as to exclude the air, but at the same time to allow of the escape of the gases evolved during the operation; and by heat applied externally the chamber and its contents are heated to a red heat, and retained at that temperature for a time. By this means not only will the process of hardening be performed, but vegetable charcoal will at the same time be produced. In charring the surfaces of timber for railway sleepers and other purposes, the pieces of timber are immersed in dilute sulphuric acid, and then packed as before. Heat is then applied externally to a temperature of about 250 to 300 degrees, and retained at that temperature for a time. By this means the surfaces only of the timber that has been saturated will be charred."

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 11.—N° 85.

WOODCOCK, William George.—"Improvements in wrought-" iron beams or girders, and columns."

"Bars of iron are rolled nearly of a trough shape, two of them " rivetted or bolted together back to back constitute a beam or " girder, having flanges both at top and bottom. At the outer " angle of each bar is a depression of a wedge shape, and when " two of the bars are fixed together, two of the depressions being " opposed to each other at top and bottom of the beam, constitute " dovetails. Joists of wood may be inserted in the said dove-" tails, to which joists, flooring, or other woodwork may be " connected or joined."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1861, February 1.—N° 271.

DE ARRIETA, Jose Joaquin.—"Certain applications of chassa-" pote and its products, and of the same combined with other " substances, and of materials treated therewith, to various pur-" poses in manufactures and the useful arts."

"The application to rails, railway chairs, and sleepers, of " chassapote combined with other substances, especially with " silicious or other mineral matter, by immersing or steeping " the rails, chairs, and sleepers in such chassapote mixture while " hot."

[Printed, 6*d*. No Drawings.]

A.D. 1861, February 9.—N° 333.

WHILIE, Charles.—"Improved rolling machinery for rolling " iron and other metals."

"Instead of rolls with grooves decreasing in size on the " length of the rolls, in using which rolls the bar or bloom must " be entirely free from one groove before it can be inserted in the " next, and much time is necessarily occupied by taking the bar " or bloom over the rolls with large levers and tongs and turning " it sideways for the purpose of edging (the object of this inven-" tion is to do away with laborious work, and to work the iron or " other metals while in a welding state). For this purpose rolls " are placed in a vertical or approximatively vertical position, or " at an angle in the midst of, or conjoined with a series of hori-

" zontal rolls with one or more grooves in them, and at such a " distance that the iron or metal may be enabled to enter one " pair of rolls before leaving the other pair.

" This invention is more particularly applicable for blooming, " roughing, or slabbing rolls, yet in many instances it can be " applied to finishing rolls. The iron is brought from the " furnace on a carriage, and is thrown between the first pair of " rolls, and then passes through the whole series of them without any stoppage, and without manual labour, consequently the " iron will be more properly welded, which is of the greatest " importance in rail making."

[Printed, 6*d*. Drawing.]

A.D. 1861, February 19.—N° 410.

NEWTON, Alfred Vincent.—(*A communication from Joseph M. Heard.*)—" An improved mode of coupling the rails of rail-" ways."

" The object is to connect together the abutting ends of rails " in a manner that will allow of the expansion and contraction " of the rails consequent on the changes of temperature, and to " provide against the springing of the rails at the joints, occa-" sioned by the vibration of passing trains. And to neutralize the " effect of lateral thrust at the joints."

" By cutting away a portion of the head of the rail at each end, " and in cutting a horizontal slot a suitable distance into the neck " of the abutting rails; and in forming the joint or joints after " the rails are laid down by the introduction of an artificial head " bearing piece that breaks joints with the rail, and serves to fill " up the spaces cut out of the rails, and to strengthen the rail " at the joint against lateral and downward strain; and in con-" junction with this brace support is used a fishing bar that is " placed on the opposite side of the rail, and serves to strengthen " the rail. The whole are to be secured together by bolts and " nuts."

[Printed, 6*d*. Drawing.]

A.D. 1861, February 25.—N° 480.

BARNES, Edmund Forman.—" An improvement in railway " chairs, and being a combined chair and splice."

" In combining a railway chair and a splice, which serves the " purpose of a joint to hold the ends of the rails in position and " prevent them moving, and is so arranged that there can be no " opening between the ends of the rails to affect the motion of " the carriage, or by which the rails can be injured by the percus- " sion of the wheels, but a continuous unbroken bearing surface " is secured."

[Printed, 8*d*. Drawings.]

A.D. 1861, March 1.—N° 530.

BIRCH, EUGENIUS, and MERTENS, HERMAN DIRS.—(*Provisional protection only.*)—" Improvements in the permanent way " of railways."

" In a peculiar form of combined sleeper, chair, and fishing " plates, of wrought iron. The plate from which they are made, " is bent or drawn whilst hot, so as to bring its opposite edges " near to each other, and to turn them up for the purpose of " forming the fishing plates.

" The general section of the sleeper is that of a hollow arch, the " rail being gripped between the turned-up edge of the plate, and " remains suspended above the base of the plate and out of con- " tact therewith, so as to allow it to yield to a passing load, and " so form an elastic permanent way."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 4.—N° 547.

EMERY, SAMUEL ANDERSON.—(*Provisional protection only.*) —" Improvements in portable apparatus for transporting locomo- " tive engines and trains from one line of rails to another."

" In arranging portable apparatus suitably constructed for " being readily put together and taken to pieces, and easily " carried in the guards van or other suitable portion of the " train, so as to be available in case of any accident, slip, or other " casualty blocking up one line of rails the trains could be shifted " on to the opposite line till the obstruction be removed, when the " crossing could be taken up and carried away, leaving the line of " rails perfect and fit for immediate traffic."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 5.—N° 555.

SCOTT, THOMAS.—(*Provisional protection only.*)—"Improve-
"ments in the construction of roadways and tramways."

Exactly the same as in his Specification, A.D. 1861, N° 2199.

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 12.—N° 606.

STOCKER, ALEXANDER SOUTHWOOD.—(*Provisional protection only.*)—"Improvements in the manufacture of rails for "railways."

"In the manufacture of metal bars upon which the wheels of "the rolling stock of railways are intended to travel, and consists "in the application for that purpose of a metal known as steel "iron in combination with ordinary wrought iron, or the steel "iron may be used in its entire state."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 14.—N° 632.

ROESSLER, FREDERICK.—(*Provisional protection only.*)—"Improvements in apparatus or means for preventing locomotive "engines and carriages leaving the rails."

"In the application of an extra line or lines of rails placed "parallel with the ordinary rails of a suitable form, so that guard "clips secured to the carriages will pass along such rails without, "however, being in contact therewith. The clipping or holding "parts of the rails are disposed in opposite directions to each other "so as to embrace the clips on the carriages, or the carriage clips "may be arranged to embrace the rails. In either case the carriage clips consist of strong rigid iron supports depending from "the carriage or engine framework, the terminations of which are "furnished with parts to clip or pass underneath the flange of the "safety rail; these supports are also furnished with shoe pieces "or surfaces, which are adapted to slide on the rail and support "the carriage in the event of a wheel coming off or breaking. "Both this shoe and the clip embracing the safety rail flange are "so adjusted that they travel in close proximity to the rail, but "without touching."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 14.—N° 639.

HUNTER, JAMES.—" Improvements in moulding and shaping " metals."

" In an improved mode of casting wheels, rails, pillow blocks, " and other generally similar details, so as to obtain hard and " durable surfaces thereto, as well as economy of time and expense " in moulding. Under one modification the mould is made " entirely of iron, in two parts, in manner similar to the ordinary " sand moulds; these parts are placed one upon the other, and " when so arranged a cavity is left between the parts correspond- " ing to the form of the wheel to be cast. A metal core is " arranged in the centre of the mould which passes through the " two parts, and this forms the aperture in the centre of the wheel " to receive the axle or spindle, which may be either fast or loose, " a vertical tubular aperture is formed in the upper half of the " mould which conveys the molten metal down into the cavity " formed in the body of the mould."

[Printed, 8*d*. Drawing.]

A.D. 1861, March 18.—N° 676.

ARROWSMITH, JOHN.—(*Provisional protection only.*)—" Im- " provements in street railways and railways on common roads, " and in locomotive engines and carriages for the said railways."

" In attaching a rack to the side of one or both rails, or fixing " it midway between the rails extending either the whole length " of the line of railway, or only along those parts where there are " inclines. The use of the said racks is to prevent the slipping " of the wheels of the locomotive engine."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 22.—N° 721.

CLARK, WILLIAM. — (*A communication from Messrs. Henry Lawrence, Charles Harcourt White, and Thomas Washington White.*)—" An improved method of locking the nuts on railroad " rail bolts."

" The object is to prevent the nuts or bolts which are used to " secure strengthening bars on each side of the joints of railroad " rails from wearing loose, in consequence of the jarring and con- " cussions occasioned by the passing of trains."

" By interposing washers between the nuts and fishing bars,

" and securing the nuts to said washers by means of spring " pawls on the nuts engaging with ratchet teeth on the washers, " so that the nuts may be set up when desired, but will be effec-" tually prevented from turning loose."

[Printed, 8*d.* Drawing.]

A.D. 1861, March 25.—N° 746.

BEERS, Sidney Alexander.—" Improvements in rails for tram " roads, and in laying down the same in streets and highways."

" In forming the surface of the rail so as to guide a common " wheel with a flat tyre, and laying down such rails so that both " edges are on a evel and equally flush with the surface of the " roadway."

" In laying down the tramroad, a narrow longitudinal trench " is opened in the roadway for each line of rails, and at dis-" tances equal to the usual length of the rail; a thin iron plate, " some eight by sixteen inches, is firmly bedded on the bed of the " pavement. Upon these plates the rails are placed, the successive " joints resting upon the rail plates, the rails placed in proper line " and gauge, the wedges driven into place, and the earth firmly " tamped under the base of the rail so as to furnish a uniform and " continuous bearing."

[Printed, 8*d.* Drawings.]

A.D. 1861, April 3.—N° 823.

SEVILLE, John, and LAWTON, William.—(*Provisional protection only.*)—" Certain improvements in starting and retarding " or stopping railway trains."

" In the employment, in connection with the buffer or framing " of the same, of a chamber conveniently situated for discharging " sand, steel filings, or other suitable minerals, earths, mixtures " or compositions upon the rails, with the view of obtaining a " firmer hold of the wheels, or preventing them slipping, and " thereby facilitating the starting and retarding or stopping of " the train, the said materials being discharged from the receptacle " when required by the opening of the valve in the lower part of " the same, and a flexible pipe or tube employed in connection " with the outlet passage in the lower part of the receptacle for " conducting the sand to the rails."

[Printed, 4*d.* No Drawings.]

A.D. 1861, April 4.—N° 830.

SHEPARD, William Albert.—(*Provisional protection only.*) —" Improvements in street railways, and wheels, and apparatus " to be used therewith."

" One form of rail (which may be called a guide rail) has two " flat surfaces or wheel tracks, one on each side of a raised centre " rail which runs continuously with the flat surfaces. This raised " portion of the rail may be made of a rounded or angular form, or " in place of a raised rib or rail a groove may be formed between " the two plain surfaces suitable for receiving a flanch on a wheel. " The other rail which is to be laid parallel to the one above " described to complete a line of way is (wherever the track is " straight or the curves are not too abrupt) a simple flat rail of " the same width as the other. Both these rails are to be " laid flush with the street. The wheels have each two flanges " which project one on each side of the treads or peripheries of " the wheel sufficiently to run smoothly upon the flat surfaces at " the sides of the raised centre of the rail, the raised part of the " rail thus becomes a guide to keep the wheels, and the carriage " upon the line of rails. These wheels are each in two parts, the " plane of division being perpendicular to the axle of the wheel, " and being a continuation of the plane of the inner surface of " the inner or outer flange of the wheel according as the cases " may require. When a wheel is thus divided, one part is fixed " to the axle and revolves with it, which the other revolves on the " axle, thus preventing the two flanges from binding on a curved " way and from running of the guide rail. When a groove, in " place of raised rib or rail is used the wheels are made with a " rib or projecting band or ring to run therein and be guided " thereby."

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 5.—N° 839.

BROWN, David, FELLOWS, Noah, JONES, Edward, and BROWN, William.—" Improvements in the manufacture of " nails, railway spikes or pins, and gas-tube fastenings, and in " machinery employed in the said manufacture."

In rolling iron for making nails, it is preferred to roll the bars of such a figure that when cut transversely two nails are produced, joined together at the summits of their heads, the junction being so slight that the two nails form by each cutting generally separate in the act of cutting, or if they do not, they may be readily separated afterwards.

Before cutting the iron so formed into nails, we so far flatten it as to bring the two halves into the same plane. Also in rolling iron for making headed nails of such a form as to resemble in cross section only one headed nail. The bars of iron rolled as before described are cut by means of machines, similar to those commonly employed for like purposes, excepting that a groove is made in the shears to correspond in figure with the section of the nail, spike, or pin, or gas tube fastening.

Also in making headed nails by rolling broad bars of iron of such a figure that they have in longitudinal section the figure of a series of headed nails joined together, either head to head, and point to point, or head to point. The said bars are slit while hot by means of slitters, and thereby produce a series of headed nails joined together, which said nails may be readily separated or broken off from one another.

[Printed, 10*d*. Drawing.]

A.D. 1861, April 13.—Nº 915.

ABEL, Charles Denton.—(*A communication.*)—(*Provisional protection only.*)—"Improvements in the constructions of turntables."

"These improved turntables consist of two pair of parallel bearers suitable sectional form, one pair being at right angles to the other pair, so as to intersect each other, and the distances between the respective bearers of each pair corresponding with the guage of the railway, which four bearers are all cast in one piece of cast steel, together with a portion of a ring corresponding with the diameter of the turntable, and connecting the ends of the two bearers of each respective pair.

"The turntable has also a further portion cast in one with it situated in the central square space formed by the crossing of the four bearers, and containing the socket by which the turntable is made to rest upon the fixed upright central bearing fixed to the foundation plate."

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 17.—N° 945.

CLARK, William.—(*A communication.*)—" Improvements in " atmospheric post for the transmission of letters, papers, and " other despatches and articles in tubes."

" The system of postal delivery called atmospheric post, de- " scribed, has for its object the transmission of despatches, " papers, parcels, and other matters, by means of a vacuum " obtained in a tube in which is a box furnished with a piston, " containing the objects to be transported. This system is based " on the application of parts, by means of which it may be ren- " dered practical and adapted for regular postal service. Thus " supposing the cylindrical tube to commence at a central point, " and, after having traversed a certain number of stations or " offices, between which a regular exchange of despatches is " required, to return to the point of departure; that in this tube " the piston moves furnished with an air-tight packing, and " attached in any suitable manner to a box containing the de- " spatches; at each station are disposed stops, so as to be able to " remove the despatches intended for a certain station and to " insert those for transmission thence; a certain number of appa- " ratus is used and disposed at intervals to register the passage " of the boxes; the whole are also in electrical communication " with each other and with the central station. Such is the system " upon which this mode of atmospheric post is established."

[Printed, 10*d*. Drawings.]

A.D. 1861, May 1.—N° 1085.

BRAMWELL, Frederick Joseph, and OWEN, William.— " Improvements in the manufacture of rails, bars, plates, cylin- " ders, vessels, axletrees, cranks, wheel tyres, and other articles of " wrought iron or steel, and also in the machinery used in such " manufactures."

" In a mode of manufacturing rails, bars, and plates, so as to " avoid the loss arising from the cutting off the ends, and the " loss of time and labour in bringing them over the top of the " roll. An annular pile is made by coiling iron spirally around a " mandril, or by other means, and then after having heated this " pile to a welding heat it is hammered into an annular bloom. " This bloom, or this annular pile if not hammered into a bloom, " is placed between a pair of rollers so that the rollers nip a por-

" tion of the circumference of the annular pile or bloom, and " thus continuously roll it out, diminishing the section of the " ring and increasing its diameter until the section is that which " is required for the finished rail, or the thickness required for " the plate. The complete ring is then removed from the rolls, " cut through and opened out into a bar, rail, or plate, and " straightened by hammers or by passing through rolls. In the " case of rolling thin plates, which would not retain sufficient " heat to admit of their being cut and flattened after they were " removed from the rolls, cutters are provided by which the " cylinder is cut while in the rolls, and delivered from them as a " sheet."

[Printed, 6*s*. 4*d*. Drawings.]

A.D. 1861, May 4.—N° 1128.

SMITH, Edward Pease.—" Improvements in the construction " of radial traversing carriages."

" This invention relates to certain means for traversing loaded " carriages or trucks over a segmental or circular railway, for the " purpose of enabling such trucks to deposit their loads in arcs of " circles, by which means the construction of segmental or circular erections (such, for example, as forts for protecting the " sea coast, and which require their foundations to be laid under " water), will be greatly facilitated.

" This invention also applies to the transference of railway " carriages and engines to lines of railway radiating from the " centre of segmental or circular railways.

" In carrying out the invention there is laid down a segmental " or circular railway of any required radius and gauge, and mount " thereon a traversing truck carriage, which consists of a strong " framing or platform mounted on flanged wheels, and provided " with a pair of rails of suitable gauge for receiving the railway " trucks, carriages, or engines to which it is intended to impart a " radial traverse motion. The wheels of the truck carriage or " radial railway, as it may be termed, are driven through the intervention of suitable gearing, the motion being transmitted from " the outer to the inner wheels, and in such manner as to give " less surface speed to the inner than to the outer wheels, to suit " the smaller diameter of circle over which they have to travel."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1861, May 7.—N° 1148.

BEERS, Sidney Alexander.—" Improvements in rails for " street railroads."

" In a particular form and manufacture of such rails, and in " the method of securing the joints and laying the track."

" In laying the rails no longitudinal string piece is used, but " the rail is spiked to cross ties placed at distances of about six " feet apart, or, when preferred, the rails are placed upon thin plates " of iron or tile at the joints, and the earth is tamped up firmly " under the base the whole length of the rail, and hold them in " guage by iron rods at suitable distances."

[Printed, 8*d*. Drawings.]

A.D. 1861, May 10.—N° 1187.

DUNLOP, Andrew.—" Improvements in endless or portable " railways for facilitating the traction or draught of vehicles."

" Each wheel of the vehicle runs upon a series of short rails " which are jointed together at the ends so as to form a flexible " band, as it were surrounding the periphery of the wheel. There " are, by preference, eight of these rails to each wheel, and each " rail is, in order to obtain as much lightness as possible com- " bined with the requisite degree of strength, formed of wood " cased with iron. The rails are connected together in pairs by " means of rods of malleable iron, that is to say, each rail is con- " nected to the one that is diametrically opposite to it. The rods " which are jointed to the centres of each pair of rails extend in- " wards towards the centre of the wheel, where they are connected " by means of moveable links to each other, and these links are " also jointed at their centres to a ring having two laterally " diverging arms, which ring runs loosely on the axle."

[Printed, 1*s*. Drawing.]

A.D. 1861, May 11.—N° 1197.

WILSON, William.—" Improvements in the manufacture of " wooden keys and treenails for railways and shipping, and in " machinery employed therein."

" In sawing and planing them taper by improved machinery, " which ensures uniformity in size and shape, and an easy entrance " into the chair."

" In making them parallel three-fourths of their length, and " then taper or conical to fit the chair, the head of the treenail to " be convex."

"The wood is subjected to a chemical process by boiling in oil " until thoroughly saturated, and then dried."

"The improved machinery for manufacturing the keys consists " of a frame carrying a cutting tool, which frame is made to move " up and down on standards to bring the cutting tool to act upon " the wood; the wood itself is supported against a guide or guage " upon a table hinged in such manner that the position of the " wood may be altered to obtain the cut required by inclining the " table."

[Printed, 10*d*. Drawing.]

A.D. 1861, May 17.—N° 1258.

DUNN, THOMAS.—" Improvements in machinery and apparatus " for altering the position of locomotive engines, carriages, and " goods, and preventing injury and accidents on railways."

In constructing railway traversers in such manner that those wheels working under the traverser and carrying the weight thereof may be enlarged, and work with less jerks than usual; also, that a less number of wheels than heretofore are required. A narrow gap is cut through the rail of the permanent way, to support and strengthen the said rail by fish-plates or other suitable means, and so form a through cross tram plate, or a relieving piece to answer nearly the same purpose may be used. By this means the engine and carriage wheels pass over a narrow gap without touching the cross tram rails, in place of the traverser wheels as formerly.

Secondly, it relates to altering the position of railway engines, carriages, and goods by applying a traversing frame, having a centre pin fixed at each end, which pin when depressed into a footstep raises the wheels off their bed, thereby converting the said traverser into a semi-turntable, capable of being used to turn an engine, carriage, or goods, end for end, or entirely round, or to any required angle.

In making turntables steady, secure, and safe during the quick transit of engines, carriages or goods. To effect this the table bottom is composed of a series of strong rings of cast or wrought iron, so that the bearings are very short from one ring to the other; all the rings are turned or made true to receive a top of similar construction, which beds firmly upon the bottom, and when together they are very firm and rigid. The top is raised for the purpose of turning an engine, carriage, or goods by means of a long lever or cams, or by hydraulic or other power, which will overcome the weight of the table top and its load, and so lift it off its bed; the top turns upon a centre piece and pin or ball.

In preventing injury and accidents on railways. To effect this the engines or carriages are made with double axles, one part working within the other, so that in case one should break or be disabled the other may carry its load into a station without injury or accident. Also in forming the bosses of wheels of sufficient depth to meet together, or to be joined by a hollow packing as a substitute for a hollow axle; or the hollow axle may be flanged at each end and form part of the wheel. Also in forming the under side of the carriage so that it will work upon the outer axle, in case a journal end should break off or become disabled.

The invention relates to moving engines, carriages, and goods safely at high velocities, which high velocities or speeds endanger the wheels, axles, journals, guards, and under structure generally.

This part of the invention consists in constructing the side frames of carriages so as to work into grooves made in side frames applied to railways, and also to form the said side frames of railways of sufficient strength to support the bodies of the said carriages, so that in case of any breakage of the wheels, axles, or underwork of the carriage, the body part would be supported and slide along like a sledge, instead of coming to the ground or being overthrown. The framing forming the road and guides may be made of timber, stone, iron, or other materials, or the fixed rail or road may fit into a double guide on the carriage to suit convenience, the object being to make the carriage body or top of goods' waggons, engines, or other carriages, to rest on the slides when the underwork gives way.

[Printed, 5*s.* 8*d.* Drawings.]

A.D. 1861, May 17.—N° 1267.

ASHCROFT, Peter.—"Improvements in railway chairs and "fastenings."

"For these purposes one of the jaws of a railway chair is "formed with an inclined inner face in the direction from the

" top to the bottom, in order to receive a wedge vertically between the inclined inner face of the chair and a filling piece " interposed between the jaw of the chair and the web of the rail, " and such wedge is prevented moving sideways by means of " ledges or projections formed on the inner face of the jaw " between which the wedge is driven. The filling piece is made " of cast or wrought iron, and is formed on one side to fit the " hollow of the rail (or rails, if it be in a joint chair), and on the " other side it is formed with angular grooves and ridges, so that " when a wood or other soft wedge is driven in between the jaw " of the chair and the filling piece the wedge will become grooved " on that face which is in contact with the filling piece, and the " other side of the wedge will become similarly grooved where it " comes against the jaw of the chair, by reason of the inner inclined face of the jaw of the chair being also formed with " angular ridges and grooves; by this means the wedge and the " filling piece will be prevented moving sideways, whilst the " wedge being driven vertically, will at all times have a tendency " to descend in the space between the jaw of the chair and the " filling piece."

[Printed, 6*d*. Drawings.]

A.D. 1861, May 21.—N° 1292.

GRIFFIN, George Featherstone. — (*Provisional protection only.*)—" Improvements in the manufacture or construction of " railway chairs and their fastenings, the latter being applicable " to other purposes."

" To facilitate the taking up rails for turning, and to dispense " with the use of loose keys or wedges in fixing the rails in the " chairs, by constructing the chairs in two parts, one part in the " form usually adopted, the other of a separate jaw partially " curved, which is made to press a piece of recessed wood, or other " suitable material against the rail, as in a vice by means of a " a screw bolt, with a wedge-shaped head, placed under and " through a corresponding wedge-shaped or tapered hole, cast in " both parts of the chair, and so adjusted that by tightening the " nut which secures the wedge bolt, the upper part or separate " jaw slides over the under part, and presses the wood against " the rail."

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 6.—Nº 1438.

NEWTON, William Edward.—(*A communication.*)—" Im-
" provements applicable to railways for the purpose of facilitating
" the transport of carriages containing goods and passengers
" across arms of the sea, rivers, lakes, or inland waters."

In constructing a vessel into which the laden railway carriages may be run from the end of the land railway, and may be conveyed by such vessel to the outer side of the water, and may be run out of the opposite end of the ship on the other line of railway. To effect this, openings, which may be closed with doors, are made at each end of the vessel, and decks are constructed at proper levels, and provided with rails.

The doors at one end of the vessel are opened, and the carriages are run from the land railway on to the rails in the vessel, which is then propelled across the intervening water space, and when it arrives at the opposite side, the doors at the other end of the vessel are opened, and the carriages run out on to the rails of the railway on that side. The bodies of the carriages are provided with small grooved truck rollers, and they are run on to trucks, on which are fixed rails for the purpose.

The carriage bodies are secured on these trucks by chains, pins, or in any other convenient way, so that they can be easily detached.

[Printed, 8*d*. Drawing.]

A.D. 1861, June 7.—Nº 1441.

VAUGHAN, John.—" Improvements in the manufacture of
" railway sleepers."

These improvements consist in moulding surface, packed, or bowl sleepers for tram and railroads, by having the pattern of the usual shape, or any other form suitable, with two loose ends, one at the gib end and the other at the key or cotter end; these ends being kept in a firm and correct position during the operation of moulding. The pattern is then drawn from the sand mould in the usual way, leaving the two loose ends. After adjusting and finishing the mould the loose ends are drawn out. By this method the greatest accuracy is obtained in the length between the gib and key ends of the sleepers giving a very correct gauge between the rails.

[Printed, 10*d*. Drawing.]

A.D. 1861, June 8.—N° 1465.

RYMES, JAMES.—" Improvements in the permanent way of " railways."

" The patentee proposes to form the rails in the form of a " cross, but having the corners at the points of intersection " rounded or eased off, so as to fall in the acute angle, and thus " allowing the rails to be made tubular, if desired, for the purpose " of drainage. The chairs to be used for these rails would be " better of wood, the centre thereof being grooved or channelled " out with a V-groove, to allow of one of the projections on the " rail to drop into the two side peices restings on the top of the " wooden chair. The rails are to be secured to the chairs by " bolts or screws passed through their centres at about the angle " of 45°, corresponding holes being formed in the rails to allow " of their being taken up and turned round when worn. Thus it " will appear that eight running surfaces can be presented in " succession without the necessity of metal chairs or new rails."

[Printed, 6*d*. Drawing.]

A.D. 1861, June 28.—N° 1657.

LANE, MICHAEL.—" Improvements in the permanent way of " railways."

" For these purposes longitudinal bearers of wrought iron are " used, and they may be of any desired length, and they may be " employed at intervals along the rails of a railway, but it is " preferred that they should be continuous. The bearers are " each composed of two separate parts, one outside and one " inside of the rail, and the two parts are both rolled or " formed to a similar section. Each of the two parts of a " bearer consists of a plate by preference of about six inches " in width, but this may be varied, and the plates may be " of any desired length. These plates rest on the ground at a " slight inclination from the side of the rail which they support. " The edge of each plate which comes next the rail is turned " downwards to the extent, of about three or four inches. At " the sides of the turned down parts of the two parts, and near " the upper surface where the rail is received between them, " grooves are formed, one in each plate, and by preference " angular grooves, so that when the two grooves of the two parts " of a bearer come opposite each other they will form a dove-tail

" space between the two turned-down parts of the plates of which " a bearer is composed. These plates are connected together at " intervals by screw bolts and nuts, the bolts passing through the " turned-down parts of the plates. These rails used with these " bearers are rolled with an under web or projecting rib which is " of a dovetail section, or of such other section as will correspond " with the space produced by the grooves, in the two parts of " which a bearer is composed."

[Printed, 6*d*. Drawing.]

A.D. 1861, July 3.—N° 1685.

RICHARDSON, Robert.—(*Provisional protection only.*)—" An " improved railway chair for railways."

" By which the upper lips of iron half chairs are by elongation " made to wedge through or into each other on opposite sides of " the rails and in opposite directions, so as to firmly secure the " rails in the chairs without the aid of wooden keys."

" It applies equally to single and double-headed rails, and also " to the construction and application of half-chairs in such a " mode as to retain the wooden or iron wedges or keys in their " places on each side of the rail and thus obviate the necessity of " the half-chairs wedging, as before mentioned, and by simply " placing them in contact with the ends of the wooden or iron " wedges or key before referred to, prevent the keys or wedges " from becoming loose and falling out."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 3.—N° 1668.

SIMONTON, John.—(*Provisional protection only.*)—" An improved traction engine, and apparatus applicable for the cultivation of land."

" First, an endless railway or platform placed below the frame " of the engine, which will support the weight of the engine, and " at the same time in a peculiar way take hold of or grasp the " surface of the soil firmly and tenaciously, so that the power of " the engine may be applied to the traction of cultivating implements."

" The endless railway or platform consists of rails, wheels, and " sleepers, arranged in an inverted order from that of an ordinary " railway, the rails being fixed to the frame of the engine, run

" over and upon the wheels which are connected to and sup-
" ported by the sleepers, which are jointed together in the form
" of an endless chain, and which constitutes the moving platform.
" These cross sleepers are of an angular form in cross section, and
" have their apices downwards when on the ground. By means
" of this engine and endless platform, implements of culture
" which operate on the soil are impelled or dragged, motion being
" communicated to the endless chains of sleepers by a steam
" engine to produce the tractive force required."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 23.—N° 1843.

GRIFFIN, George Featherstone.—" Improvements in the
" permanent way of railways."

" The rails rest on hollow sleepers of cast iron corrugated, in
" order to give a great amount of bearing surface and strength,
" and such sleepers may be oblong and placed at certain distances
" apart. Chairs are dispensed with, and the rails secured in
" position by means of jaws, which may be cast on each end of the
" sleeper, and made partially to suspend or support the rail, and
" those on one side are fitted with a spring catch firmly set in the
" sleeper, which is intended to fall into a ratchet cast on the rail
" key."

" Instead of the spring catch, vulcanized india-rubber, or other
" elastic material enclosed in metal is used, and shooting a metal
" bolt or other spring apparatus which will effect the same object
" as the spring."

" The rail is secured in its proper position by means of fasten-
" ings, which cannot work out by vibration or by changes of
" temperature, and the use of wooden sleepers, and nuts, bolts,
" trenails, wedges, screws, or similar pieces are dispensed with."

[Printed, 10*d*. Drawing.]

A.D. 1861, July 26.—N° 1874.

JOHNSON, Frederick, and HOCKIN, Bartholomew.—
" Improvement in securing or fastening nuts for railway fish
" plates, and for other purposes."

" In dividing the point of a screw bolt or pin longitudinally to
" an extent sufficient to enable a thin metal wedge to be inserted
" therein, for the purpose of expanding the point of the bolt after

" it is in position and the nut has been screwed on. The wedge " piece should be of a width not exceeding the diameter of the " bolt at the bottom of the threads at the part where the slot is " formed, and we prefer to form a slot or long hole in the upper " part or portion of it to admit of a split pin being passed " through it."

[Printed, 6*d*. Drawing.]

A.D. 1861, July 29.—N° 1889.

BUSBY, WILLIAM, and BUSBY, DANIEL.—(*Provisional protection only.*)—" Improvements in street or road rails for omni- " buses and other vehicles."

" The invention relates to the shape and mode of fixing rails " for tramways on streets or roads, so that vehicles having wheels " constructed with the ordinary or any plain tyre can run on the " same. The tops of the rails are formed with slightly raised " guiding feathers on either side of the bearing surfaces, the said " bearing surfaces are shaped to the form and breadth of tyre best " adapted for the streets or roads where the rails are laid down, " and which may be concave, convex, angular or other form, but " by preference a perfect plane.

" The bottom or under side when resting on transverse sleepers " is perfectly smooth, but when longitudinal sleepers are used, " have tapering flanges on either side to fit over the same. " Running angularly from the vertical sides between the guiding " feathers and flanges, or feathers and under side, are small " countersunk holes or apertures, through which, and into the " sleepers, are passed the fastening bolts or spikes."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 7.—N° 1963.

HUGHES, EDWARD THOMAS.—(*A communication from Rey. Jean.*)—" An improved wheelbarrow wagon."

" This invention consists of making the shell or mouth part of " the barrow to move on a centre or eccentric attached to the " framework, so that when it is to be emptied it can be upset in " the same manner as the ordinary shoot waggons used by exca- " vators. Two wheels may be used for ordinary roads and four " for railways. This swing or shooting wheelbarrow is applicable

“ to all ordinary purposes, or may be used very advantageously “ for the excavations for railways.”

[Printed, 6*d*. Drawing.]

A.D. 1861, August 10.—N° 1993.

STOCKER, Alexander Southwood, and STOCKER, Alexander Richmond.—“ Improvements in the manufacture of “ horse-shoes, boot-heels, wheels, tyres, rails, and safes.”

“ In preparing bars and plates for the purpose above mentioned “ according to the invention, puddled bars or plates of wrought “ iron, are placed in an ordinary converting furnace, and operated “ upon in the same manner as is generally practised when converting iron into steel. These bars or plates are intended only “ to be partially converted, so as to leave the inner part of the “ metal in its fibrous condition, whilst the outer surface or surfaces “ are hardened to a greater or less depth, and on one or more “ of its surfaces, as circumstances may require; then formed into “ a pile of any desired number also of suitable length, breadth, “ and thickness; then the pile is heated to a fusing or welding “ temperature, and passed through an ordinary rolling mill, “ whereby the whole becomes thoroughly incorporated and welded “ together in one solid mass, and rolled out to dimensions “ requisite for the purpose intended.”

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 15.—N° 2034.

KAIN, Francis Allen.—(*Provisional protection only.*)—“ An “ improved manufacture of artificial stone or earthenware applicable for bricks, tiles, retorts, railway sleepers, and other “ articles.”

“ In crushing to powder and sifting small and refuse or other “ slate in combination with other materials, and also vitrify the “ same in kilns at a high temperature.”

The form of the composition is as under:—Take of

Fine powdered slate - - - -	24 pounds
Carbonate of magnesia - - -	3 ounces
Fine sand powdered - - - -	3½ pounds
Fine ground silica - - - -	5½ ounces

“ The whole of these to be thoroughly mixed together, and then “ add nine pounds of wet clay of any description, and sufficient

" water to form the plastic mass of a consistence suitable for " moulding the articles required."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 20.—N° 2063.

INGRAM, George.—" Improvements in trams to be used in " connection with the wheels of carriages on common roads."

" In forming an endless tram through the medium of jointed " link couplings, channelled throughout on the inner surface, " in which the wheels take and are cause to run, bearing guide " rollers being employed for directing and giving increased free- " dom to the action of the said tram, and the said tram being " applicable to a line or train of carriages by causing the first " pair of wheels to be provided with a tram arranged as above " described, whilst the remainder thereof are to be furnished " with a tram passing round the peripheries, so as to form one " continuous channel way round the same."

[Printed, 10*d*. Drawing.]

A.D. 1861, August 22.—N° 2102.

BAINES, William.—" Improvements in the construction of " girders, frames, or other suitable apparatus, fixed or moveable, " and for certain peculiar forms or sections of iron used therein."

" In the forms or sections of plates used in the construction of " these frames or compound girders, one part of each is male and " the other female; by bringing these parts together they become " inserted, and being secured by bolts or rivets, effect a vertical " union and continuous bearing, branching or extending where " required; and in constructing the moveable parts of railway " turntables, the plates are bent and formed into suitable parts or " segments, and secured in their respective places by bolts or " rivets, thus constituting one entire frame, forming its necessary " cross girders, which may be produced to suit any angle for any " number of roads upon the table."

[Printed, 10*d*. Drawing.]

A.D. 1861, September 4.—N° 2199.

SCOTT, Thomas.—(*Provisional protection only.*)—" Improve- " ments in the construction of roadways."

"Instead of paving or pitching the roadways, trays or open "boxes, or frames of iron and wood are employed, and they are "packed full of flat pieces of stone or other material placed on "edge. The stones so packed in the trays may be set in sand, "gravel, or other substances, or grouted with cement or mortar, "so as to form one solid block, or they may be simply wedged in "tight. Such trays, so filled with stones, are placed on the "prepared foundation of the roadway, with the stone surface "uppermost, so that when the whole is filled in with them it shall "present generally a level surface, the irregular interstices between "the stones affording a better hold for the horses' feet than the "present methods of forming the roadways do. It is also proposed to employ these trays either to form tramways of themselves, or the roadway for any form of tramway."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 5.—N° 2218.

NAPIER, JOHN.—(*Provisional protection only.*)—"Improvements "in machinery for rolling iron or other metals."

"Two or more pairs of rolls are arranged at suitable distances "apart from one another, in such manner that the metal to be "operated upon shall pass straight onward through any requisite "number of pairs of rolls placed in succession, and all in or "about the same line or direction, the first pair being like the "ordinary roughing rolls, and the last pair suitable for bringing "the plate, bar, or other form of metal down to the finished or "required size. Each pair of rolls thus driven, so that in the "process of rolling, the plate or bar whilst being rolled may be "passed through one, two, or more pairs of rolls at the same "time, the speed of each pair of rolls being such as is necessary "to compensate for the extension or elongation of the plate or "bar as it passes from one pair of rolls to another."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 23.—N° 2376.

PRICE, JAMES. — "Improvements in the permanent way of "railways."

"The invention relates to a peculiar system or mode of forming

" the joints of ordinary bridge rails or other flat-bottomed rails " employed on railways, applicable either to new lines or to " existing lines where such rails are employed. According to this " invention it is proposed in forming the joints of bridge or flat- " bottomed rails to employ a wrought-iron chair of a sufficient " width to contain the flanges of the rail and receive the fastening " bolts which secure the chair to the sleeper, such bolts passing " through the chair but not through the flanges of the rail, the " edges of which they touch or nearly touch when in their places. " A washer plate is laid upon each side of the chair, and projects " some distance over the rail flanges at the joint or abutting ends " of the rails, so that the bolts which are passed through these " plates and through the chairs will then, when screwed up tight, " compress the washer plates firmly down upon the rail flanges, " and thereby hold the rail ends securely in their places.

" It is also proposed as a further improvement in the joints of " bridge rails, to use in combination with the arrangement above " described, a dowel of compressed or uncompressed wood, which " is driven tightly into the hollow of the rails at the joints, half " the dowel being enclosed in each rail."

[Printed, 8*d*. Drawing.]

A.D. 1861, October 4.—N° 2476.

HUGHES, Edward Thomas.—" Improvements in the per- " manent way of railways."

" In forming each chair with a large bed plate, having inclined " edges on the outside to prevent the accumulation of water or " sand. One of the cheeks of the chair is moveable, and so " formed that the rail rests upon it between the cheeks. The " lower part of the said moveable cheek fits a groove in the bed " plate, and is pressed up by a key or wedge so as to force the " moveable cheek against the rail, and hold it fast. Under the " bed plate there are strong ribs for the purpose of obtaining " strength, and to prevent the chair from shifting in the ground. " Connected to each chair there is a bar extending across the line " in order to hold the two opposite chairs firmly at the proper " distance apart, and some of the chairs are provided with long " cheeks acting as splints to allow of the junction of the rails."

[*Printed, 6d.* Drawing.]

A.D. 1861, October 10.—N° 2538.

CLARK, William.—" Improvements in apparatus for bending " iron rails or bars."

" This invention relates to an apparatus for straightening and " bending iron of all sections while in a cold state, both flat and " edgewise, in one operation.

" It is especially applicable for shaping and bending all kind of " railroad rails, which are bent in a cold state in the flat when " required to be used for small or sharp curves, and edgewise " when placed at the junctions of inclines with the horizontal " way, and in both directions simultaneously when required. " The form of the cylinders or rollers may be modified according " to the shape of the iron to be worked. An apparatus to be " used in railroad workshops is mounted on four wheels, so as " to be easily moved on the line. The apparatus is furnished " with three or five cylinders according to the work to be done, " that with three cylinders shapes and bends, while that with " five cylinders shapes and bends rails and other iron in any " direction."

[Printed, 8*d*. Drawing.]

A.D. 1861, October 11.—N° 2541.

RICHARDSON, Robert.—(*Provisional protection only.*)—" Im" provements in the manufacture of railway fastenings, and a " mode of preparing rails and fish plates to receive them."

" In the manufacture of spikes, bolts, and screws used as " fastenings for rails and fish plates on railways by rolling into " shape and cutting them without the aid of a second heating, " and also in an improved manner of preparing rails and fish " plates to receive the said spikes, bolts, and screws by punching " the holes of the rails and fish plates in a conical shape with any " number of sides not less than three."

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 15.—N° 2568.

GILBERT, John.—" Improvements in endless railways."

" The invention consists in an improved endless railway, so " constructed that it can be worked at a high speed without " noise. It can be applied to all common road vehicles, whether

" such vehicles are drawn by horses or propelled by steam or " other power, and can be made available not only for heavy goods " and passengers, but likewise for ploughing or cultivating land. " It consists in so constructing an endless railway, that each short " piece of rail shall be moved in regular succession, so that at " least one length is at rest on the road for the wheel to roll upon, " and when the wheel has passed over, it is then taken up and " carried over the top of the wheel, and again placed in position " under the running wheel. The rails, chairs, and sleepers are so " connected together that no depression can take place at the " joints of the rails when the wheel is passing over them, but " form one continuous and unyeilding rail."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1861, October 19.—N° 2616.

BERGUE, Charles de.—" Improvements in sleepers, chairs " for the permanent way of railways."

" The casting or forming sleeper chairs with a dished or curved, " and hollowed, or flatly tapered base or bottom (to be used with " the convex or projecting side downwards) with cross ribs or " webs, or with one or more circular or other ring like ribs or " webs, or with a rib or ribs in addition to such ring like rib " or ribs within the upper concave side of such bed plate base " or bottom.

" Also the casting or forming sleeper chairs with parts of the " ribs or webs fashioned for forming a seat for the rail, on which " the rail may be firmly bedded, and so that the rail and sleeper " chair may be secured together by one fastening only.

" And also the casting or forming sleeper chairs with ribs or " webs or projections from the convex or lower side of such " sleepers, so as to admit of the adaptation and fastening of the " tie bar to the under side of the sleeper and securing it thereto " by means of the same bolt or fastening which secures the rail " above."

[Printed, 10*d.* Drawing.]

A.D. 1861, October 21.—N° 2652.

DAVIES, George.—(*A communication from Smith, B.*)—" Improvements in railways, and in iron pavements and railways " *combined,* parts of which improvements are applicable to the

" construction of railway chairs, and to cast-iron pavements for " ordinary streets."

" Firstly," this invention consists " of a railway composed of " two or more cast-iron girders, constructed and bedded directly " into the ground, in the manner described hereafter, so as to " dispense with the usual wooden sleepers or other foundations, " as well as with the ordinary chairs and spikes.

" Secondly, in combining cast-iron girders as above bedded " into the ground with malleable iron rails, for the purpose of " readily removing and replacing the rails without displacing the " girders, and in confining the said rails to the girders. On the " upper surface of the girder, and at suitable distances apart, are " cast lugs or projections, between which fits the rib of a single-" headed rail, a strip of wood or other suitable material being " interposed between the under side of the rib and the surface of " the girder, and a wedge-formed key driven transversely through " the lugs and the rib of the rail.

" Thirdly, of a combined railway and pavement, constructed so " that the wheels of ordinary vehicles can freely traverse the " pavement without being obstructed by the rails, the said pave-" ment being so arranged that any portion may be readily removed " without disturbing the whole pavement or raising the adjacent " parts."

[Printed, 1*s*. Drawings.]

A.D. 1861, October 24.—N° 2660.

CAMPBELL, Alexander Francis.—" Improvements in rail-" ways."

The improvements consist in applying a central rail along the line of way adapted to receive or act on suitable wheels between the bearing wheels of the carriages, for the purpose of preventing the carriages running off the line of way, by which wheels with a plain or unflanged surface may be used as the bearing wheels.

[Printed, 6*d*. Drawings.]

A.D. 1861, November 18.—N° 2897.

POUILLET, Charles Marie.—(*Provisional protection only.*)— " An improved mode of constructing and fixing the rails of rail-" ways."

" First, in the construction and employment of a rail, with a " rib formed on the under side, and inserted in a groove cut in a " sleeper, with flanges projecting from the base of the rail, but " above the rib, and resting on the upper part of the sleeper; " keys are used for securing the rail to the sleeper or wood screws, " or other means may be adopted for this purpose. The junction " of the rails is effected by flanged fish plates tightened up by bolts. " It is preferred that this junction should take place between two " sleepers brought close together and resting on the same table or " bed, but the union may be effected on the sleeper itself, in " which case the flanges must be made so as to enable them to be " bolted on each side of the sleeper. Sometimes, for the sake of " economy, short sleepers are employed between those extending " across the line."

[Printed, 10*d*. Drawing.]

A.D. 1861, November 29.—N° 3009.

ELLIS, Thomas.—" Certain improvements in rails for per- " manent ways."

" In making rails, as regards transverse section, of a peculiar " form, the rail being made hollow, or what is termed a bridge " rail, but rolled in such manner that the base, or each side of " the rail will meet or nearly so in the vertical centre line or plane " of the rail, thereby making a more solid bearing on the longi- " tudinal timbers, the object being to prevent the sides of rail " collapsing, a defect which in some cases is obviate by intro- " ducing a flat bar of iron between the bridge of the rail."

[Printed, 6*d*. Drawings.]

A.D. 1861, December 4.—N° 3045.

PULLAN, Alexander, and LAKE, William.—(*Provisional protection only.*)—" Improvements in traction and other engines, " and in wheels for traction engines and other carriages, and in " giving motion to ploughs and other agricultural machines."

" When supplementary rails or shoes are employed with the " bearing wheels of traction engines and other carriages. The " adjoining shoes are connected together by means of a link or a " pair of links, and there are teeth on the peripheries of the " wheels to take into teeth in the shoes to prevent the driving " wheels slipping round on the rails. When the shoes are not

" required, by removing the pin or pins connecting one of the " links or pair of links to one of the shoes, the series of shoes will " fall off."

[Printed, 4*d*. No Drawings.]

A.D. 1861, December 13.—N° 3133.

QUANTIN, Pierre.—" Manufacturing moulded earthenware or " stoneware cross sleepers for superseding wooden ones in the " construction of railways."

" The sleepers can be made of various sizes and shapes to suit " the rails of different descriptions; they are composed of two blocks " of earthern or stoneware moulded to an uniform shape, which " two blocks are united together by an iron rod of suitable " strength. Thicknesses of felt or any other similar compressible " texture are inserted betwixt the blocks of earthenware and con- " necting iron rod or bar; the chairs are placed over the rod or " bar and the whole is bolted fast together to form cross sleepers " ready to receive the rails."

[Printed, 6*d*. Drawings.]

A.D. 1861, December 21.—N° 3211.

SELBY, Frazer.—" Improvements in boilers for the generation " of steam in engines, for applying steam for motive power pur- " poses, and in wheels and ways for steam carriages to run on."

" The invention relates to the wheels of locomotive and traction " engines and the tramway for them to run on. The rim of the " wheel is made of an inverted V shape, with or without flat side " rims, so as to run on a tramway or not; the rails are in the form " of tubes of wrought or cast iron, or of a half circle, by which " means the engine will gain more tractive power than with " ordinary flat rails. Where no tramways are used a flange is " fixed on both or either side of the wheels, which may be called " a flange wheel of smaller diameter than the other part of the " rim, so that when the engine runs over soft ground it will bear " on the flanges as well as on the wheels; and on the rim of the " wheel is fixed, at convenient distances apart, plates, by prefer- " ence in the form of horse-shoes, to give greater power to the " forward motion of the engine, and thereby prevent slipping."

[Printed, 2*s*. 2*d*. Drawings.]

A.D. 1861, December 30.—N° 3253.

EDWARDS, John.—(*Provisional protection only.*)—" Improve-" ments in the permanent way of railways."

" In making railway chairs with an opening sufficiently wide " to take the head of the rail; and filling pieces are placed in the " channels of the rail, and the rail is then dropped into the opening in the chair, and is held fast with or without wedging. Also " in making projections on the sides of the rails which fill up the " opening in the chair, and the rail is held fast with or without " wedging. Also the placing a cushion of suitable material in " the bottom of the chair, so that the concussion is broken whilst " a train is passing, and the bottom of the rail prevented from " being injured. Also in making the spike or bolt holes in railway chairs obliquely, instead of perpendicular as at present."

[Printed, 4*d*. No Drawings.]

1862.

A.D. 1862, January 14.—N° 102.

HUGHES, Ebenezer William.—" Improvements in malleable cylinders and tubes used in engineering and architectural " structures."

" This invention, being equally applicable to the permanent " way of railways as well as to structures in general, consists in " constructing cylinders or tubes suitable for columns or supporters, by forming and combining plates of wrought or malleable iron, each of which is rolled with two outer projecting " flanges, which are produced at angles greater than a right " angle to the plane or outer surface of the plate."

[Printed 8*d*. Drawings.]

A.D. 1862, January 18.—N° 135.

STEVENS, James John.—" Improvements in point indicators " for railways."

" The invention is intended to indicate to the person in charge " of the working of the points, when such points are at a distance " from him the proper action or otherwise of the points which he " desires to work."

The patentee says, "For this purpose I erect at the side or
" opposite to the points a pillar, on the upper part of which there
" is a diaphragm of any desired shape divided into two parts,
" capable of being separated and of being brought close together.
" I make by preference the lower part of the disc movable, while
" the upper part is stationary. By a chain or bar I connect the
" movable part to a wheel or pulley at the bottom or lower part
" of the pillar, and to this wheel I also connect a rod attached to
" the fly rail. The point is worked by the attendant through
" chains, wires, or rods, by means of a pull-over lever in the
" ordinary manner, and upon the fly rail being brought in contact
" with the main rail the parts of the disc are separated or are
" closed, according to the manner in which the indicator is set to
" act. In order to render this a night as well as a day indicator,
" I erect at the back of the disc a lamp with colored glasses,
" which may be made by showiug a different colour, or by not
" showing any light at all to indicate that the points have acted
" properly or the reverse. In some cases I make my indicator
" double, that is to say, I cause it to face both to the attendant
" and to the driver of the train, and thus indicate to both parties
" in opposite directions at the same time.

[Printed, 10*d.* Drawing.]

A.D. 1862, January 21.—N° 151.

KNIGHT, John Adams. — (*A communication from Hiram Carpenter*).—"Improvements in the permanent way of railways."

" The object is to connect the cross-ties, sleepers, or pedestals,
" and chairs and rails, in such a way that they will constitute a
" complete and well-secured system without the intervention of
" any fastenings whatever, by fitting the cross-ties and pedestals
" together with a socket or lock joint, and in combining them
' with chairs that conform to the section of the rails, and hold
" them securely, without the usual taper keys or wedges. To
" prevent the injury incident to concussion upon a perfectly rigid
" support, india-rubber or other elastic material is interposed
" between the parts in such a manner that it is easy of access, and
" permits the adjustment of the track without disturbing the
" pedestals or ballasting of the roadway."

[Printed, 8*d.* Drawing.]

A.D. 1862, January 23.—N° 179.

YATES, Henry.—(*Provisional protection only.*)—" Improvements in machinery for bending, repairing, or renewing defective or damaged parts of iron rails."

" On a suitable bed frame, table, or block, two dies, shaped according to the form of rail or bar to be operated upon, are arranged, one or both being moveable. These dies are for the purpose of gripping or retaining the damaged or defective portions of the rail or bar while in a highly heated state, and reducing it by pressure to its original and natural form, as well as for holding any other portion of the rail or bar while the process of welding is carried on, with a view to renew any part of the surface. The dies or jaws may be actuated by levers, eccentrics, or any other means."

[Printed, 4*d*. No Drawings.]

A.D. 1862, January 28.—N° 227.

IRLAM, William.—(*Provisional protection only.*)—" Improvements in the construction of railway crossings and turntables."

" In securing the steel or wrought-iron plates to the foundation plate of the crossing, by casting them together."

" The plates are moulded in the sand with the foundation plate, they are then removed and heated, and replaced in the mould into which the molten iron is run in the usual manner. By this means the plates are firmly united with and adhere to the foundation plate, thus dispensing with the bolts or rivets heretofore requisite."

" The improvement in turntables is applicable to those turntables which are made with cast-iron revolving platforms or tops, and it consists in chilling or hardening that part of the table top on which the wheels of the engine and carriages run, so as to dispense with the rails which are usually bolted on the table top, thereby increasing the strength and durability and avoiding the working loose of the rails."

[Printed, 8*d*. Drawing.]

A.D. 1862, February 3.—N° 288.

CLARK, William.—(*A communication from Heinrich Sperl, Rcihard Hagen, and Wolfgang Springer.*)—" Improvements in

" processes for preserving and colouring wood, denominated " xylochromic and xyloplastic processes."

The patentee describes processes for colouring, preserving, and hardening wood, and rendering it non-inflammable, increasing its durability, and injecting it, to render it fit for use as railway sleepers, and for other purposes.

[Printed, 8*d.* Drawing.]

A.D. 1862, February 7.—N° 328.

CLARK, **William**.—(*A communication from Henri de Lapparent.*)—" Improvements in preserving timber, which are particularly applicable to the timbers of ships or other maritime " structures."

" This invention consists in a peculiar arrangement for carbonizing large wooden constructions, such as the hull of a ship. " From what has been before mentioned, it will be understood " that in order to effect the preservation of the wood in a comparatively short time, 1st, the wood must be deprived of the " greatest possible amount of sap, and consequently of the fermenting properties it contains; 2ndly, to submit the wood " before the parts are put together to an artificial desiccation; " 3rdly, to singe the face of the wood when the work is finished " by a slight carbonization."

This invention is also used for charring railway sleepers.

[Printed, 8*d.* Drawing.]

A.D. 1862, February 7.—N° 328*.

CLARK, **William**.—(Disclaimer and memorandum of alteration,) filed June 22nd, 1863, for " Improvements in preserving " timber, which are particularly applicable to the timbers of ships " or other maritime structures."

The assignees disclaim the whole of the first, second, and fourth claims, also part of the third. The invention as it now stands is for " the method of carbonizing wood by the aid of a jet of " inflammable gas of any suitable nature which is projected on the " wood in position, which process is especially applicable to the " hulls of ships."

[Printed, 4*d.* No Drawings.]

A.D. 1862, February 14.—N° 397.

DODSON, Arthur John.—(*Provisional protection only.*)—" An improved composition for coating, covering, or protecting " ships' bottoms; applicable also for coating or covering railway " sleepers, telegraphic wires, and other surfaces, and likewise as a " cement, and as a substitute for metal for certain constructive " purposes."

" The invention consists in the manufacture of a composition, " suitable for the forgoing purposes, by combining pulverised " slate with vegetable or mineral pitch."

" The proportions recommended are:—Two-thirds slate to one-" third pitch, and sometimes tar is combined with the pitch."

[Printed, 4*d.* No Drawings.]

A.D. 1862, February 19.—N° 440.

ADAMS, William Bridges.—" Improvements in springs, and " their arrangement for moving and stationary purposes."

" Abutment keys of spring steel or elastic metal, to hold rails " in chairs, two forms of keys are shewn, to give a firm flat bearing " against the chair jaw, which holds the rail."

" Another form of the elastic key is a straight or slightly curved " bar driven in between the rounded chair jaw, and a hollow " casting which presses against the rail, by this mode any requisite " tightness may be provided for without leaving it to the dis-" cretion of the workmen to overdrive the key which is not a " wedge, but of parallel thickness."

[Printed, 10*d.* Drawing.]

A.D. 1862, February 24.—N° 498.

NEWTON, William Edward. — (*A communication from Raymond French and William Goddard.*)—" Improvements in the " joints of chairs of the permanent way of railways."

" The object is to strengthen and unite the rails where they " meet by some simple and cheap means that will be efficient, " and that will prevent or lessen the jarring or pounding of the " passing wheels, which is so destructive to the rails; and the in-" vention consists in shrinking the iron chair to the rails at their " joint, and thus preserving the whole surface bearing of the " chair and rails, and making an extremely solid and firm joint

" without the necessity of keys or wedges for holding the rails " and chairs together. In carrying out the invention, the chair " is to be heated and driven on the end of one rail, and the end " of the next rail may then be driven into the other end of the " chair, which, when cool, will contract and hold both rails firmly " in their place."

[Printed, 6*d*. Drawing.]

A.D. 1862, March 7.—N° 610.

REVELL, JOSEPH.—(*Provisional protection only.*)—" Improvements in securing the rails of railways and tramways to the " chairs."

" The rail is secured to the chair by means of an improved key, " wedge, or packing. The said packing is made to fit tightly in " the hollow or sunken bed, and also to project a little from the " surface of the key pressing firmly against the rails. On the " side of the key pressing against the chair, the upper part may " be in contact, or quite free, without any packing whatever; but " in the lower part is sunk a rebate or groove, and in connection " with it a sunken bed of dovetail or other suitable shape, into " which is placed a locking or tieing key previous to the main " key being driven between the rails and chair. The said key " may be made of wrought iron, zinc, lead, or other suitable " metal or material, but lead is preferred, as being the most suitable material on account of its specific gravity, and being less " liable to decay or loss in value than any other metal. After the " main key has received the packing in the hollow or sunken bed, " and also the tieing or locking key, it may then be driven into " its place in the same manner as the ordinary wedges are " driven."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 14.—N° 709.

MUIR, MATTHEW ANDREW, and McILWHAM, JAMES.—" Improvements in railway sleepers and chairs."

" The improved sleeper is cast in the form of a disc. There is " a central boss, or raised part, which forms a base from which " the chair jaws spring; this part of the sleeper is cast thicker " than the other portion, and below it is further strengthened by " a transverse rib, which extends across the under side of the

" boss, and has formed on it a feather, which is immediately under " the centre of the rail, and which fits a notch in the bar. The " sleepers, when laid upon the rails, are connected by means of " transverse tie bars, which extend a little beyond the centre of " the sleeper, and this part of the tie bar is notched, to fit the " feathered part of the central rib of the sleeper. The tie bar is " fastened to the sleeper by a saddle bolt, which passes up " through the disc, and is secured thereto either by a nut or split " key."

" The second part of the invention refers to a mode of fixing " rails in the chairs. Under one modification, as applied to " double-headed rails, the rail is placed in the chair bearing " against the parallel face of the inner jaw, and between the " other face of the rail and the contiguous jaw is placed a bolster " piece. The outer face of the bolster piece is formed with a " central recessed part, and the ends which form the bearing surfaces for the key are curved, or they may form plane surfaces " extending in an angular direction from the ends of the bolster " piece towards the recessed part in the centre. The inner face of " the contiguous jaw of the sleeper is cast to a figure corresponding to the opposite face of the bolster piece, and a curved key " is driven in between the jaw and the bolster piece. When the " key is driven in, its curved surface presses against the corresponding parts of the bolster piece, and the rail is thus tightly " wedged up between the parallel faces of the bolster piece and " the inner jaw of the chair. The same general arrangement or " mode of fixing is also applicable to rails supported by the head " of the rail resting on the jaw of the chair and bolster piece. " The bearing surfaces which press against the ends of the rails " being parallel, cannot interfere with the expansion or contraction of the rail arising from changes of temperature, neither " can this motion in either direction affect the security of the " joint."

[Printed, 1*s*. Drawing.]

A.D. 1862, March 15.—N° 719.

GRANT, John.—" Improvements in the construction of portable " railways, and in the trucks or carriages to be used thereon."

" The rails are secured upon longitudinal wooden sleepers, of " convenient length for a man to carry. The ends of these

" sleepers are provided with tongues and sockets, so that they " may be fitted together and the ends be thereby supported " reciprocally when a weight passes over them. The proper width " between the rails may be maintained by means of transverse tie " rods bent up at their ends, so that they may be inserted in holes " or sockets made in the longitudinal sleepers for the purpose; " and these transverse rods may be provided with carrying pullies " for supporting a rope, if it be desired to work the railway trucks " with stationary engines. Crossings, or turn-outs, are made of " separate pieces, curved or otherwise, according to the particular " kind of crossing required. A turn-out at or near a right angle " may be made with one curved piece in combination with a " moveable or swivelling straight piece, which will form part of " the direct track, but is capable of turning on its centre, like a " turntable, when required."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1862, March 18.—Nº 751.

DUNN, THOMAS. — "Improvements in the construction of " bridges, roofs, houses, and other structures."

" The invention consists in certain improved modes of con" structing beams, girders, bridges, roofs, fences, ship sides, and " other structures, and in the application of such improved beams " and girders, and of beams and girders of the ordinary construc" tion in an improved manner."

" And for the purpose of rendering the invention more clearly " understood, and easy to carry into operation, the Patentee has " annexed one hundred and four sheets of drawings," and thirty-six pages of letter press.

The following are the claims he makes:—

" First, the use of rolled iron and steel of the various new sec" tions shewn when used in the construction of bridges, roofs, " houses, and other structures, and the various modes of applying " double-headed and other railway bars in such structures."

" Secondly, in constructing lattice beams, girders, and other " structures of iron or steel with ribbed bars, he claims the " cutting away or indenting the ribs at the crossings to form " abutments for the purpose of relieving the strain on the rivets."

" Thirdly, in constructing them of flat bars of iron or steel, he " claims the interlacing of such bars for relieving the strain on the

" rivets and increasing the lateral and tensile strength of the " structure."

" Fourthly, the improved plate beams and girders, with lattice " work or pilasters or ornamental work at one or both sides."

" Fifthly, the improved modes of constructing and erecting " bridges without the aid of centres or under scaffolding."

" Sixthly, the improved suspension bridges, and the land ties " for the same."

" Seventhly, he claims the compound suspension and girder " roofs, particularly applicable for roofs of wide spans."

" Eighthly, the improved modes of securing the ends of the " suspension chains or wire ropes of suspension roofs."

" Ninthly, the improved modes of constructing the roofs of " polygonal buildings."

" Tenthly, the use of sheet of iron or other metal pressed into " the form of brickwork, stones, slates, tiles, or other forms used " in the construction of houses or other structures."

" Eleventhly, the improved compound beams and girders of " timber."

" Twelfthly, the improved modes of constructing gates, fences, " and other similar structures, partly applicable to ventilating " ships and houses."

" Thirteenthly, the improvements in the construction and arrangement of gun boats, floating batteries, and other vessels."

" Fourteenthly, the various improved modes of constructing " armour plates for naval and defensive purposes."

" And, lastly, the improvements in the construction of moveable " land batteries."

[Printed, 2*l.* 13*s.* Drawing.]

A.D. 1862, April 4.—N° 943.

TOOGOOD, Robert Moore, and LAYBOURNE, John.— " An improvement in railway crossings."

" This invention consists in forming welded cast steel crossings by welding Bessemer or ordinary cast-steel rails from the " point of the **V** or heart piece to the intersection of the two " rails."

N.B.—This is the Complete Specification.

[Printed, 4*d.* No Drawing.]

A.D. 1862, April 15.—N° 1083.

HEAP, Charles Rogers.—(*A communication from Antonio Gabrielli.*)—(*Provisional protection only.*)—" An improved con-" struction of railway chair."

" This invention relates to a novel construction of wrought-iron " chair for securing the rails of railways in position. The chair is " composed of two wrought-iron plates, one overlying the other. " The under plate is made rectangular, and forms the base of the " chair, and the upper plate, which is smaller, lies across it diago-" nally, but so that its extremities extend to the ends of the base " plate. These plates are connected together by a central bolt, " which forms a pivot for them to turn on. The central bolt, " when the chair is to be fixed in position, passes through a " central hole in the plates, and is driven into a wooden sleeper " intended to support the chair. The jaws of the chair are formed " by turning up portions of the sides of the two plates at right " angles. By this means each plate is furnished at its opposite " edges with a jaw, which jaws with jaws of the other plate form " pairs that are intended to embrace the rail that is to be placed " in the chair. Between the jaws of the joint chair and the rail " iron, clamping pieces rolled so as to fit the web and bottom of " the rail are placed, and the abutting ends of two rails being " inserted therein they will be retained in position."

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 16.—N° 1111.

ASHBURY, John.—" Improvements in the permanent way of " railways."

" An improved mode of securing the rails. It is proposed to " use a rail having the ordinary bearing flange at its upper sur-" face, but with a slightly tapered or wedge-shaped web in trans-" verse section, the narrowest portion of the rail being at its lower " edge. This rail is dropped into a chair, the inner surfaces of the " jaws of which are made to approach each other towards the " lower portion of the chair, thus presenting a tapered or wedge-" shaped opening or trough for the reception of the correspond-" ingly tapered web of the rail, which fits it accurately at the sides, " Any heavy weight passing over the rail will tend to force it " down into its chair, and will, consequently, still further tighten " it therein without the necessity for keys or wedges of any kind.

" The rails may be prevented from rising from their chairs by pins " or bolts passing transversely through the rail and jaws of the " chair, a ring or collar serving to prevent the accidental dis- " placement of the bolt, but in some cases these bolts or pins may " be dispensed with. The joint chairs are made like the inter- " mediate chairs, but wider, and a bolt or pin is passed through " the two jaws and through an opening made between the rail " ends, so that one bolt will serve to hold down both rail ends. " It is prefered to form these chairs by rolling them from wrought " iron plates, but they may also be made of cast iron if desired."

[Printed, 8*d*. Drawing.]

A.D. 1862, April 17.—N° 1133.

CLARK, WILLIAM.—(*A communication from Jean Baptiste Delrieu.*)—" Improvements in the manufacture of railway rails."

" This invention relates to a mode of preserving the one part " of the iron from the action of cementation, so as to permit of " its welding perfectly without the addition of any flux, by " simply placing the one part of iron in contact with the other, " of course at a proper heat and pressure, which results,—first, " in its retaining all the qualities of a good welding in ordinary " rails."

" Secondly, in the production of a casing with a perfectly " cemented surface, while the interior possesses ductility."

" Thirdly, in preserving the quality of the iron in the parts of " the casings non-acierated."

" For this purpose the covering piece is made partly of fine- " grained iron and partly of coarse grain, the two irons being " turned out rough from the puddling furnace; a rail surface is " thus obtained, which after being laminated, when broken will " present the following appearance (viz.): Upper face, fine- " grained fibrous iron; lower face, coarse-grained puddled iron. " Thus it will be evident that this improved facing unites all the " conditions required for obtaining a good welding."

[Printed, 6*d*. Drawing.]

A.D. 1862, April 23.—N° 1181.

PRICE, JAMES.—(*Provisional protection only.*)—" Improvements " in spikes for railways and other purposes, and in the mode of " manufacturing and securing the same."

"This invention consists in manufacturing an ordinary solid " spike or pin, and then splitting it longitudinally for a greater " or less portion of its length by means of a circular saw or " shears. The two limbs or halves thus formed are bevelled " inwards at the point, which causes their opening or separation " when driven into the sleeper or other timber. In order, however, " to insure with greater certainty the opening of the split end of " the spike or pin, it is proposed to use a small iron, metal, or " hard wood wedge or cone, which is dropped into or inserted in " the hole to receive the spike, which hole is to be bored to about " the depth to which the solid portion of the spike will reach " when driven home, and upon which the bevilled end of the " spike is driven, such wedge or cone serving effectually to open " or separate the split. In drawing the spike this wedge or cone, " which has previously been forced up to the extreme end of the " split, is generally drawn out with it, so that the extra width " given to the split portion of the spike must be drawn through " the small aperture formed by the neck of the spike or unsplit " portion."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 3.—N° 1313.

HEPPEL, JOHN MORTIMER.—(*Provisional protection only.*)—" Improvements in the construction of the permanent way of " railways."

" One part relates to that description of permanent way where " double-headed rails and the ordinary chairs are employed. " Longitudinal sleepers are constructed either of wrought iron or " puddled steel, the transverse section of which is formed of a " trough shape, with a flange on either side of the trough. " These longitudinal sleepers are placed opposite to each other " on the road, each opposite pair being connected together and " kept to guage by means of wrought-iron tie bars or rods. It " is preferred to form these tie rods of flat bar iron, placed on " edge between the sleepers, and with the ends twisted round so " as to lie in a flat position across the sleepers, the extreme ends " being bent into a hooked form, so as to lay hold of the outer " flange of each sleeper; the inner flange of the sleeper is " attached to the bar by means of a strap or staple passing " round the latter (which has a notch formed for that purpose),

" and through a hole in the flange, being secured at the under " side of the same by means of a split cotter. Any other suitable form of tie rod and manner of fixing the same to the " longitudinal sleepers may, however, be employed."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 7.—N° 1372.

MARCHAL, DÉSIRÉ, and DE WIART, ADRIEN CARTON.— " An improved method of preventing the destructive effects of " vibration or jar on the permanent way of railways, and on the " wheels, axletrees, and other parts of carriages, and the working " and other parts of machinery liable to shocks."

" The invention consists in the application to those parts which " are liable to shocks of a band plate, washer, or lining of lead, " tin, zinc, copper, or an alloy of these metals, or either of them. " It is applicable to the rails and chairs of the permanent way of " railways, and to the axletrees of engines and carriages, and to " various parts of machinery, and to the bearings of iron bridges. " By thus interposing a soft and elastic metal between two hard " metals or surfaces, the injurious effects of concussion will be " greatly reduced."

[Printed, 1*s*. Drawings.]

A.D. 1862, May 9.—N° 1389.

D'AUBREVILLE, LEOPOLD.—(*A communication from Pierre Guantin.*)—" Improvements in metallic cross sleepers for railways."

" The improved railway metallic cross sleepers are composed " of two plates or sheet iron pieces about ten inches wide, fifty " to fifty-four inches long, and from two to three-eighths of an " inch thick, the edges of the said plates are bent at right angles, " so as to form flanges to the longest sides of the plates, these " flanges being turned downwards. Two holes are punched " through the plates to correspond to those of the cast-iron " chairs for the bolting or fastening of the said chairs. A piece " of wood about four inches thick is inserted betwixt the plate " and chair, and they are bolted fast together (this wooden sole " must be the same size as the seat or sole of the chair, or a little " longer). Two chairs adjusted in the same manner are connected together by means of a flat iron bar of a suitable " thickness and the required length for the breadth of the way."

[Printed, 8*d*. Drawing.]

A.D. 1862, May 13.—N° 1445.

BROOMAN, Richard Archibald.—(*A communication from Jean Antoine Lauzirotti and Paul Gemelli.*)—(*Provisional protection only.*)—" An improved means or apparatus for shunting " trains."

" The object is to enable a train to be moved from one line of " rails to another without the aid of an attendant, and the invention " consists in fitting to the front or side of locomotives, " tenders, or carriages in front of a train, a projecting rod or " rods which comes or come in contact with a weighted lever or " levers on the rail, which, through the medium of rods or chains, " draw the points together and cause the course of the train to be " diverted."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 15.—N° 1467.

DICKER, John.—" Improvements in apparatus for the delivery " of bags or parcels from railway trains in motion."

" To the near side of the railway carriage is attached one or " more projecting arms from which the bag or parcel to be delivered " is suspended. When the bag or parcels have been " delivered, these projecting arms are drawn up close against the " side of the carriage by means of a counter-balance weight inside. " At the corresponding side of the railway there is erected an " upright receiving standard and frame-work furnished with " diverging lines to disengage the bag or parcel from the projecting " arm. As soon as the bag or parcel leaves the projecting " arm it is received upon an inclined platform which conducts it " down behind the standard clear of the rails. Any required " number of bags or parcels can in this way be delivered at a " station from railway trains while in motion."

[Printed, 8*d*. Drawing.]

A.D. 1862, May 28.—N° 1609.

RANSOME, James Allen.—" Improvements in the manufacture " of and in fastening railway chairs with wood trenails."

" For these purposes wood trenails are made, and are compressed, " and are allowed to cool or set in moulds or dies in " which they are compressed as heretofore; they are then drilled

" longitudinally from the head towards the point, but the lower " part or point is left solid in order to admit of its being driven " into a sleeper without injury. It is preferred that the hole thus " drilled into a wood trenail should be cylindrical in order to its " receiving a cylindrical metal spike, which should, as nearly as " may be, fit the interior of the hole closely without requiring any " considerable force to drive it in, it being desirable that the " spike should derive its principal holding by the expansion of " the trenail after it has been driven. It is desirable that the " wood trenails made with solid points or lower ends as above " described should be driven by the aid of a tool with a hollow " face (corresponding with the curvature of the upper surface of " the head of the trenail) which is placed on the top of the trenail " when it is being driven. This tool is made with a projection " on its under side which fits the upper part of the hole in the " trenail. In using these trenails to fasten railway chairs to " sleepers, the trenails are driven in through the holes in the base " of each chair into the sleepers; the spikes are then introduced " into the holes formed in the trenails, so that when the trenails " expand in use the spikes will be more and more securely held, " and the chairs will be better fastened to the sleepers than when " using metal spikes alone, or wood trenails alone."

[Printed, 6*d*. Drawing.]

A.D. 1862, June 4.—N° 1677.

PERRY, ARCHIBALD HEWISON.—" Improvements in fastenings " for and in the method of fastening together or securing railway " chairs and sleepers, and for other similar purposes."

" Instead of employing the ordinary solid or compressed wooden " trenails alone, and instead of using iron spikes of any con- " venient shape or form alone, for securing iron chairs to the " wooden sleepers of railways, as is now commonly practised," the patentee says, " I take a wooden trenail, either turned parallel with " a head or shoulder, or with any suitable amount of taper, and I " bore a hole along its axis; I also take an iron spike or round " metal pin with a head, and I flatten it at some distance above " the point; but I prefer to leave the point cylindrical, so that " there is a square shoulder formed on two sides by the flattening. " For the purpose of fastening iron chairs upon wooden sleepers, " I first bore the sleeper or other substance and then drive the

" hollow wooden trenail through the hole in the chair and into " the wooden sleeper to the required extent; I then drive the " spike or pin into the hollow trenail, which is thereby expanded " at its lower end, and thus forms a dovetail within the wood, " which will prevent the trenail from being withdrawn from the " sleeper, as also the spike or pin from being withdrawn out of " the trenail."

[Printed, 8*d*. Drawing.]

A.D. 1862, June 4.—N° 1680.

JAMES, William.—" Improvements in bolts, spikes, and nails, " and in apparatus for their manufacture."

" In making bolts, spikes, and nails of round spiral-grooved " rods, and in a peculiar apparatus for producing the twist in the " rod during the process of manufacture."

" The metal rods of which these articles are manufactured are " first rolled with one or more straight grooves or channels."

To give the required spiral direction to the "grooves or channels the rods are afterwards twisted, and finally, the spikes, " bolts, or nails are headed in the usual manner."

[Printed, 6*d*. Drawing.]

A.D. 1862, June 4.—N° 1687.

PRESTON, Frederick Philip.—(*Provisional protection only.*) —" Improvements in the permanent way of railways."

" The rail is put in a chair of suitable shape, and on one side is " inserted a cheek-piece, which has a projection fitting in a suitable slot made in the chair, to prevent its lateral movement. " When the cheek-piece is in its place, a wedge is inserted in a " hole formed by two slots, one in the side of the chair and the " other in the side of the cheek-piece. On driving in the wedge, " the cheek presses against the rail, and holds it rigidly in the " chair. To prevent the wedge getting loose, a cotter or split key " is driven in a slot made therein, and the ends of the cotter " opened out, as shewn."

" Another mode of securing the wedge is by a screw and " nuts."

[Printed, 6*d*. Drawing.]

A.D. 1862, June 5.—N° 1694.

BELL, James. — " Improvements in fastenings for railway " chairs."

" This invention relates to an improved metallic spike, to be " substituted for the trenail or fastening by which railway chairs " are ordinarily secured upon their sleepers."

" According to one modification, it is made of a piece of sheet " iron, which is bent or shaped in dies or moulds into a tubular " form, with a conical enlargement, forming the head. The edges " of the metal are not brought quite close together, but are left " slightly apart, so that the spike may be slightly compressed on " being driven home, and its consequent tendency to re-expand " will give it a firmer hold in the sleeper."

" According to another modification, the edges of the sheet " metal may be made to slightly overlap each other; or, again, " the spike may be made out of a tube, one end whereof is expanded, to form the head, being slit a short distance to admit of " the widening, if necessary. The spike may be made of various " proportions, and of metal of various thicknesses; but in ordinary cases the diameter of the shank will be about one inch " and an eighth, and the thickness of the metal about three-" sixteenths of an inch."

[Printed, 8*d*. Drawing.]

A.D. 1862, June 13.—N° 1756.

HAZELTINE, George. — (*A communication from Benjamin Morison.*)—(*Provisional protection only.*)—" Improvements in the " construction and application of rails for railways."

" In dividing the metal used in making the ordinary single-bar " flange rail into two separate or distinct parts, which for clearness of description may be termed respectively the wearing rail " and the supporting rail, and combining together in distinct " horizontal planes, or parallel with each other by means of intermediary plates or blocks, in combination with clamping hooks " or their equivalents, arranged and secured at equal distances " apart from each other, and also in such uniform relation to the " previously determined distances apart of the cross-ties or ground " sills used for the foundation of the said combined rails, as to " bring the points of attachment or application to the said cross-" ties or ground sills at such parts only of the supporting rail as

" will be midway between each pair respectively of said combined " plates and clamps, for the purpose of producing a compound " rail that will be, when laid, at least equal in strength to the " ordinary single-bar flange rail, as the same is now laid to form " a track and a track surface, having a uniform elasticity and " strength throughout, under such loads as are now carried on " railways by steam as the motive power."

" And in securing each of the joints which occur at the abutting " or contiguous ends of the said wearing rails, by means of a " longer intermediary plate in combination with clamping hooks " or their equivalents, the said plate being arranged along between " the supporting rail and the abutting or contiguous ends of the " wearing rails, so as to be, together with the said joint, midway " between two adjacent cross-ties or ground sills, for the purpose " of giving to this part of the track the same general elasticity, " and, at least, the same equality of strength, which are charac- " teristics of the other portions of the same."

[Printed, 4*d.* No Drawings.]

A.D. 1862, June 20.—Nº 1814.

JEFFERIES, WILLIAM. — (*Provisional protection only.*) —" A " new or improved rail for railways, and a new or improved chair " or sleeper for the said rail."

" The improved rail consists of a bar of wrought iron or steel, " the upper part of which resembles the upper part of an ordi- " nary rail, and the lower part consists of a shank or bar, the " sides of which are parallel. The rail in cross section has a " figure somewhat resembling the letter T in shape, excepting " that the top or upper part is thick and rounded like the head of " an ordinary rail."

" The new chair or sleeper is made of rolled or cast iron, and " consists of two upright parallel plates or bars upon a base, the " lower part of the before described rail fitting in the space " between the two parallel plates. Cross-bolts, pins, or cotters, " passed through the chair or sleeper and rail, secure the rail in " its place. Iron of the form described may be used in short " lengths separated from each other, after the manner of chairs, " or it may be used in long continuous lengths, so as to constitute " sleepers."

[Printed, 4*d.* No Drawings.]

A.D. 1862, July 2.—N° 1926.

JAMES, John. — "An improved mode of welding railway "crossings."

"The invention consists in heating the rails or plates in a rever- "beratory or other furnace or fire, in placing them in moulds "according to the sections of the rails or plates, which moulds are "used as ordinary top and bottom tools, and in welding them "under a Nasmyth's steam hammer or other like suitable hammer, "or otherwise welding them in a press or squeezer."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 8.—N° 1964.

RUSSELL, Joseph.—(*Provisional protection refused.*) — "An "improved arrangement and method of indication to be employed "in railway and other time tables."

"This invention is particularly adapted to railway time "tables, but it is also applicable to other time tables, and "is designed to render such tables or guides more clear and "intelligible, and also to economize space therein. The improve- "ment consists in the use and application of stripes, dots, "commas, or other marks or signs to any or all of the division "lines now employed to separate the rows of figures denoting "the time. For example, take the departure of a train consisting "of one or two classes of carriages; this is denoted by two marks "or signs upon the division line, and the numerals usually "employed for the purpose are discarded, and consequently the "space they occupy is saved; then if an extra class is added to "the train at a future station it can be indicated at the point of "addition by a mark, when a numeral would only tend to "confuse instead of instruct."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 12.—N° 2014.

COCHRANE, Hon. William Erskine.—"Improvements in "railway fastenings."

"For these purposes, when using plates with studs or projec- "tions thereon corresponding with the holes made in the ends of "rails such as are usually formed for receiving screw bolts of "fish plates, the plates are each made in such manner that they

" have as many studs or projections as there are holes made in " the ends of two rails, which is not new; but in place of making " the outer surface of such a plate as heretofore, it is formed with " a projecting incline on that part which comes within and below " the top of the outer jaw of a joint chair in which the ends of " the two rails are to be fixed and retained by the plate. In addition to such incline there are two other projections formed " near the upper part of the plate, so as to come (when the plate " is in its place in the chair) on either side of the outer jaw of " the chair and near its top. These projections form stops which " prevent the plate and also the rails sliding longitudinally within " the chair. Between these two projections or stops there are " formed projecting ribs which do not extend so far out from the " outer surface of the plate as the stops, and it is between these " ribs that the wedge is driven."

" In making fastenings for intermediate chairs there are no " pins or projections formed on the inner surfaces of the plates, " and such plates are shorter, but like those used in a joint chair " they have the raised inclines to receive the wedges, also the " projecting stops to come on either side of the jaws of the " chairs, and also the ribs and means of retaining the wedges " secure."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1862, July 15.—N° 2031.

COUVREUX, Alphonse.—" An improved centrifugal apparatus for casting stones and other materials, and in forming " embankments and other structures."

" The invention relates to an apparatus for throwing stones or " any other earthy matter required for the formation of embankments, dykes, and breakwaters, &c. A large wheel is used, " which revolves at a very high speed, on which are placed a " series of paddles or buckets; the stones are conveyed into the " inside of the frame by means of a shoot, and are taken up by " these paddles or buckets and thrown off at a tangent through " another shoot, which can be elevated or lowered according to " the distance they are required to be thrown; the whole is " mounted on a wooden frame; the wheel is driven by means of a " pulley and strap from an engine, or any other convenient motive " power."

[Printed, 8*d*. Drawing.]

A.D. 1862, July 30.—N° 2156.

NOCK, GEORGE.—(*A communication from Joseph Wood.*)—"A
" new or improved safety or moveable self-acting crossing for
" railways."

" The ends of the rails have a slight motion about a centre or
" point at the chair, six feet, more or less, distant from the ends
" of the rails. The two ends of the rails are clipped and bolted
" together to suit the curve of the road, and sufficient play is left
" in the chair and in the holes through which the spikes pass, to
" allow of the slight motion required. When the flange of the
" carriage wheel comes in contact with the guard rail, the carriage
" wheel on the crossing point or frog presses the moveable rails
" outwards, to accommodate the curve of the line."

" The periphery of the wheel thereby obtains a greater bearing,
" and the crossing points wear much longer than crossing points
" of the ordinary construction. The motion of the engine and
" carriage is very steady, and the passing from one line to another
" is not attended with the jarring motion which occurs when the
" ordinary crossing point is employed."

[Printed, 6*d*. Drawing.]

A.D. 1862, July 30.—N° 2158.

GEDGE, WILLIAM EDWARD.—(*A communication from Louis Eugène Jamet and Paul Jamet.*)—" Improved means or apparatus
" for securing the safety of trains moving on railways."

" The apparatus forming the first part of these improvements
" may be divided into three principal parts; firstly, a third or
" safety rail; secondly, two friction rollers, turning horizontally
" on each side of the safety rail; thirdly, of two nipples, chim-
" neys, or trivets forming boss or nave to the axles of the friction
" rollers. And, first, as regards the third, or safety rail, which is
" laid down on wooden sleepers at curves (or other dangerous
" parts of the permanent way) between the ordinary rails, and is
" elevated slightly above them. Near the extremities, and to
" permit the introduction of the flange of the rollers, it has its
" lateral faces brought nearer together, giving to the rail at its
" spring the shape of a wedge; or the upper shoulder may gra-
" dually die away. The safety rail starts before the curve begins,
" in order that the train may travel on it before the locomotive
" arrives at the curve; or it may be used along the whole line of

" railway. In the second means the centre or safety rail is dis-
" pensed with, a modification being made in the ordinary rails, by
" which the wheels of the carriage and the base or block of the
" safety brake are made to rest on a return, provided with a
" shoulder, which fulfils the office of the safety rail before men-
" tioned. The brake is shewn in the Drawings, and its formation
" will be best understood by reference thereto and to the
" description thereof. Its distinguishing characteristic is, that
" when aided by the friction rollers, a train will not leave the
" rails even on the breaking of an axle, and that it provides
" against all contact between the lower surface of the friction
" rollers and the lower shoulder of the rail."

[Printed, 1*s*. Drawings.]

A.D. 1862, August 1.—N° 2181.

BIDDELL, George Arthur.—" Improvements in railway
" crossings."

" These improvements have reference to the construction and
" manufacture of ' chilled ' cast-iron railway crossings."

" It has been found that when the chilling of the upper wearing
" surface of the crossings is carried quite up to the rail ends of
" the crossing, the extreme end edges of the chilled wearing sur-
" faces are liable to chip or break off in small fragments, from
" the weight and action of the wheels of the engines and carriages
" running over such crossings."

" Now, the object is to remedy the defects and inconvenience
" above set forth. This it is proposed to do by preventing the
" chilling action taking place quite up to the extreme ends or
" point of the upper wearing surface of the crossings. This will
" leave the parts which have been found liable to chip and break
" off less brittle, more tough, and much less liable to chip or
" break than when chilled at those parts, as heretofore. This
" effect is produced by the proper use of cores or sand, or other
" suitable material, in connection with the iron or chill, producing
" portions of the mould previous to casting the crossings."

[Printed, 8*d*. Drawing.]

A.D. 1862, August 5.—N° 2202.

PRIESTLEY, Abraham.—" Improvements in arrangements or
" apparatus applicable to locomotive railway engines and car-

" riages, for distributing sand upon the rails, and give adhesion " to the driving and brake wheels of such engines and carriages."

" The invention consists in the use of agitators and screws (or " equivalent mechanism), which being placed in a box or hopper " containing sand, receive continuous motion when required from " the axle or the periphery of the wheel of the engine or carriage, " so that the sand is uniformly delivered when required, and is " conducted down a pipe to the front of the wheels to which " adhesion is to be given."

[Printed, 10*d*. Drawing.]

A.D. 1862, August 12.—N° 2264.

BOWER, John.—(*Provisional protection only.*) — " Improvements in railway sleepers."

" This invention relates to a new form of iron railway sleeper " which it is proposed to make with a V-shaped section, with a " flange at the top of each arm, to which flanges the rail is to be " fastened with bolts or other wire, whilst the angular base of the " sleeper will rest in ballast in the usual way."

[Printed, 4*d*. No Drawings.]

A.D. 1862, August 19.—N° 2325.

FALKINER, Travers Hartley. — " Improvements in the " permanent way of railways."

" An improved mode of securing the fish plates or other con" trivances for connecting the rail ends together, which consists " in forming upon the ends of the bolts employed two screwed " portions or lengths, the one being of larger diameter than the " other, and the threads on each portion being in reverse direc" tions, the one portion being a right and the other a left-hand " thread. On each of these portions a nut corresponding to it is " screwed, that on the inner screwed portion serving as the " ordinary or tightening nut, whilst that on the outer portion " (which is of lesser diameter) being screwed in the reverse direc" tion, serves the combined purposes of jamming the inner nut, " and of counteracting the tendency of the bolts to turn loose."

[Printed, 8*d*. Drawing.]

A.D. 1862, August 22.—N° 2344.

BARRETT, William. — " Improvements in casting railway " sleepers and chairs where tie bars are used."

"The improvements are applicable when casting chairs which " have hollow inverted sleepers similar to those known as Greaves', " through which, when in use, tie bars are passed and secured by " keys. When making a mould for the casting of a chair and " sleeper of this description, cores are used to produce the " requisite holes in the castings for the passage of the tie bars."

"In place of making the core for the purpose of producing the " hole, it is, according to this invention, made in two parts; one " part is of iron and the other of sand. The portion which is of " iron is (when covered with loam) moulded in the upper box on " the convex surface, which produces the hollow of the sleeper; " the portion which is of sand is produced in the lower box in " the same manner as the other parts of the mould. Thus it will " be seen that the core is formed complete in the upper and lower " boxes, and has not to be laid in as a separate piece between " the two after the pattern has been drawn, and the mould is " otherwise complete."

[Printed, 10*d*. Drawing.]

A.D. 1862, August 23.—N° 2354.

EDWARDS, John.—(*Provisional protection only.*)—" Improve- " ments in the permanent way of railways."

"Two angle or other shape irons are placed back to back " between a web; this web and angle irons are then rivetted or " bolted together, leaving between the angle irons an opening " about two inches deep, into which a suitable shaped rail with " a feather on one side is inserted; the feather drops into the " opening left between the angle irons, and is bolted to them. " When one head is worn out it can be turned on its side and " used in that position, and when the second head is worn out " it can be turned on its other side and used in that position, " thus forming a rail with three heads for running, thereby " effecting great economy."

Seven different modifications are described.

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 4.—N° 2449.

COLES, Richard Pipes.—" Improvements in the construction " of the permanent way of railways."

" The invention relates to an improved railway chair made " hollow in the upper part, and slightly tapering upwards in the " transverse section; into this hollow are fitted two wooden " wedges, the upper one entirely fitting into the upper portion " of the cavity of the chair, and is forced into its position by the " lower wedge. The chair with its included wedges is then to be " placed at intervals and embedded in concrete of the ordinary " composition, and made level with the upper surface of the " chair, and forming a continuous bearing surface for the support of any of the well-known flanged rails; through the " flange of the rails screws are passed, securing the rails to the " wedges in the upper portion of the chair; between the flange " of the rails and the concrete is interposed a continuous surface " of wood or other elastic packing to relieve the concussive " action of the passing load. At intervals wrought-iron tie rods " are made to pass through holes in the two corresponding " chairs, and secured by a nut to prevent the lateral spread of " the gauge."

[Printed, 8*d*. Drawing.]

A.D. 1862, September 12,—N° 2515.

BOWER, John.—(*Provisional protection only.*)—" Improvements " in railway sleepers."

" This invention relates to certain new forms of cross sleepers, " to be made of wrought or cast iron or other suitable metal, of " any convenient length for such purpose, and to be in cross " section (trough like), and of a rectangular, triangular, curved, " angle V form, or of a section compounded of two or more or " of these forms, and provided with flat flanges projecting at the " top edges, and drilled for rivets or screw bolts, by means of " which, passing through these holes and through corresponding " holes in the rail flange, the sleeper and rail are securely fixed to " each other. In the case of the "double-headed rail" the " flanges of the sleeper are fixed by like means to chairs carrying " the rails and bearing on both flanges of the sleepers."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 12.—N° 2517.

HOWIE, John.—(*Provisional protection only.*)—" Improvements " in the construction of the crossings and switches of railways."

" The parts which are found to give way sooner than the other " portions of the line are those which are contiguous to the " tongue or point rails; at these parts a comparatively short " length of rail is interposed in the line of the ordinary rails, " and forming a continuation of the same. These are, by preference, formed of steel or case-hardened iron, in order that " they may wear as long, or nearly as long, as the rails which are " subjected to the ordinary wear and tear of the line. They are " fastened by means of fish plates, extending for some distance " beyond the abutting ends of the rails, and are firmly bolted " together."

" Another mode of arranging the short rails is to form them in " two parts, the lower portion of the rail being formed with a " vertical web or feather, and the upper half being of a saddle-" like figure, with a recess corresponding to the mid-feather of " the lower part. The upper portion of the rail is slipped into " the lower one, and the two are firmly secured by being bolted " together by the fish joints. This arrangement admits of the " upper portion of the rail being easily renewed from time to " time when worn."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 19.—N° 2573.

COCHRANE, William Morshall. — (*Provisional protection only.*)—" Improvements in securing the bolts and nuts of railway " fish plates."

" The bolt holes in the fish plates are made circular, and at the " outer side of the fish plate a notch or notches is made in the " side of each hole. Between the fish plate and the nut and " between the fish plate and the head of the bolt is placed a " washer or thin plate, of such size as to extend beyond the nut " or head. This washer or thin plate has by preference a projection or projections on its inner side, which enter the notch or " notches formed at the edge of the bolt hole in the fish plate, or " these parts are so arranged that the washer when pressed against " the fish plate shall not be at liberty to turn on the bolt. The " nut of the bolt is then screwed home, the washer or thin plate " applied under the head of the bolt and under the nut is bent at " its edge so that the bent parts may come respectively against the

" sides of the head and nut, by which both the head and the nut " will be prevented turning."

" It is not essential that the bolt head should be secured as " above described, as it may be secured in the usual manner by " means of a groove in the fish plate, or by means of a square or " its stem entering and fitting a square hole in the fish plate."

[Printed, 4*d.* No Drawings.]

A.D. 1862, September 26.—N° 2630.

COCHRANE, William Morshall.—(*Provisional protection only.*)—" Improvements in securing the bolts and nuts of railway " fish plates."

The same as in his specification A.D. 1862, September 19, No. 2573.

[Printed, 4*d.* No Drawings.]

A.D. 1862, September 29.—N° 2647.

ADDISON, John.—" Improvements in moorings or apparatus " for securing articles, applicable also to the fixing of chairs for " railways."

" The invention consists in the employment of plates of metal " of sizes proportioned to the strain likely to be exerted upon " them, which are placed in pits made in the earth for their reception, " prepared with a bottom of loose earth, on which the plates " rest, and into these pits, after the placing of the plates, sufficient " water is admitted to cover the plates to create a perfect atmospheric " pressure. On the upper part of the plates chairs fo " holding rails are fixed."

[Printed, 6*d.* Drawing.]

A.D. 1862, October 2.—N° 2666.

JOHNSON, John Henry.—(*Provisional protection only.*)—(*A communication from John Lackland.*)—" Improvements in the " permanent way of railways." This improved form of railway " chair and construction of joint for the rail ends, and consists " in casting the upright jaw of the chair which is on the inside of " the rail separate and distinct from the plinth of the chair, and " of a wedge form. The outer jaw is cast on the plinth in the " usual manner; the upper part of the plinth on the inside of the " rail is made with a raised tablet, which acts as a butt to the

" wedge jaw which is inserted between it and the rail, thereby " firmly holding the rail in its position. This wedge jaw is locked " by a screw bolt passing through it and the plinth and screwing " into one oblong wrought-iron nut inserted in the under side of " the plinth. When stone block sleepers are used, the chair " plinth at that part upon which the rail rests is made to receive " a cushion of lead or other suitable material, thus preventing " immediate contact between the rail and the upper part of the " chair plinth. This lead or other cushion is retained in its place " by the moveable jaw of the chair. The chair itself is secured to " the stone block by the screw bolts passing up through the stone " and the plinth of the chain, and a nut screwed on above. In " using wooden sleepers, the ordinary method of securing the " chair by a twisted or jagged spike is adopted."

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 4.—N° 2683.

BILLUPS, JONATHAN EDWIN.—" Fixed points for railways."

" This invention consists in dispensing with the moveable " tongues and switches, and substituting in place thereof fixed " points, so arranged that they will always keep the carriages, " engine, or otherwise, within a proper track."

This invention cannot be described without reference to the drawings.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1860, October 15.—N° 2776.

MOLYNEUX, ECHLIN.—" An improved carriage with a travel- " ling railway attached."

" The invention consists in the construction of a carriage so " related to and connected with two short lines of rails that it " shall change from one to the other by the revolution of its " wheels without the rails being required to move either laterally, " diagonally, or vertically, and that a portion of its moving force " shall be employed to shift successively each line of rails as it " becomes free to a position on the ground over which the " carriage will have to travel immediately on leaving the rails " upon which it is bearing, and so to form a continuous travelling " railway of two short and independent lines of rails."

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1862, October 15.—N° 2781.

DE BERGUE, CHARLES.—" Improvements in the permanent " way of railways."

" Firstly, in forming the chair or the sleeper with seating for " the rail of a form corresponding with the section of the double-" headed rail, or nearly so, but without the common upright lugs " or jaws, such seating providing a lateral abutment for the " inner side of the lower head of the rail."

" Secondly, in forming the clip-piece so that it shall not only " press upon the upper side of the lower head of the rail, to " prevent the rail rising or jumping, but shall also present an " abutment or resistance, against which the web of the rail shall " bear to maintain the rail in the intended upright position, and " so prevent its tilting over the tail of the clip-piece itself, also " taking a lateral abutment against the chair or sleeper."

" And, thirdly, the use of the foregoing in combination with a " double-headed rail and a single bolt with each clip-piece to " form permanent way."

" And, fourthly, in forming the clip-piece with a portion to pass " under the rail and to bear against the inner side or edge of its " lower head; in this case the tail of the clip-piece resting upon " but not laterally abutting against the chair on the sleeper."

[Printed, 1*s.* 8*d.* Drawings.]

A.D. 1862, October 16.—N° 2790.

BARNINGHAM, WILLIAM.—" Improvements in the permanent " way of railways."

" The invention consists in making railway sleepers, either " transverse or longitudinal, of wrought iron, rolled to a semi-" elliptical or other suitable form, to combine strength with " lightness, and of sufficient area to be firmly supported on the " ballast. The rails are attached by bolts or otherwise to chairs " or half chairs, which are welded, rivetted, or bolted to the " sleepers, or the chairs may be formed of strips of metal cut " from the top of the sleeper on three sides, and bent into the " required form to suit the shape of the rail. When bridge or " other flat-bottomed rails are employed they may bear upon and " be connected to the sleepers by bolts or rivets."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1862, October 22.—N° 2847.

HUGHES, EBENEZER WILLIAM. — (*Provisional protection only.*)—" Improvements in turntables and turn-bridges."

" In constructing the fixed circular track on which a turntable " or a turn-bridge is supported and turns, it is formed with a " hollow groove, and, by preference, of an elliptical cross section, " which groove is between two circular ridges or rails suitable for " the support of wheels. The under surface of the turntable is " made with a similar circular groove. In the groove of the fixed " circular track are placed a number of spheres on which the groove " of the under side of the turntable is supported. In the centre " of the fixed circular track is a fixed upright axis which passes " through the centre of the nave or boss of the turntable. Small " spheres are introduced between the upright axis and the hollow " centre of the boss of the turntable. Between the circular fixed " track and the turntable there is a circular frame, which also " turns on the central fixed upright axis. This frame is composed of several radial rods or bars, fixed at their inner ends to " the central boss, and at their outer ends they pass through and " are affixed in a circular ring which is of somewhat less diameter " than the inner ridge or rail before mentioned of the fixed " circular track, and they extend beyond the outer circumference " of the fixed circular track."

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 28.—N° 2904.

DUNCAN, CHARLES STEWART.—" An improved compound or " material for coating or covering metallic and vegetable sub- " stances, to preserve them from corrosion or decay."

" The compound is applicable for protecting and covering " heathing of all charaeters, girders, bridges, balconies, or iron- " work of all kinds, when exposed to destructive influences, and " it should be applied to the surface of the metal previous to " the application of paint or varnish."

" The compound is also applicable to the coating or preserving " of metallic work of other kinds, and to coating wood and " woodwork, such as piers exposed to sea water, or to wharves, " and also to palings, railway sleepers, and telegraph posts, " previous to their being coated with paint, varnish, pitch, or tar."

[Printed, 4*d*. No Drawings.]

A.D. 1862, November 8.—Nº 3018.

SPRUYT, CHARLES WILLIAM.—"Improvement in rails for "railways."

"The invention consists in forming rails in two parts, the foot, "the web, and a shoe in one piece, and the top in another piece. "The top is shrunk, bolted, or otherwise attached to the shoe, "and when worn it can be removed, and another top may be fixed "on the same shoe; and in inserting between the shoe and the "top a layer of lead, hardened rubber, or other material softer "than iron."

[Printed, 8*d*. Drawing.]

A.D. 1862, November 28.—Nº 3193.

CLARK, WILLIAM.—(*A communication from Jules Vautherin.*)— "Improvements in the permanent way of railways."

"This invention relates to the application of T and bridge "rails as the transverse sleepers of railways, so as to form rail-"road ways wholly of metal. When using bridge rails, they are "inverted, thereby having the flanges uppermost, to which is "rivetted a plate of iron, on which the chair is fixed, to receive "double-headed rails. Single-headed rails are secured to the "plates by means of what are termed gibs and keys, when used "for keying connecting rods in machinery. They are placed in a "vertical position, a gib being placed on each side of the rail. "The double head of the gibs embrace at bottom the plate, and "at top the foot of the rail, while the key, being afterwards "inserted, forces them up and keeps them in position. The iron "plate before mentioned may have inclined surfaces, so as to give "the ordinary slant to the rail on the inside, in curves or other-"wise. When employing chairs, the plate may be furnished with "two ribs rolled on it, on which the rail bears, in addition to the "chair, thus giving a widely-increased bearing surface to the rail. "Instead of employing bridge rails, the transverse sleepers are "formed of T-iron, the iron plate for the support of the rail being "rivetted to the head of the T."

[Printed, 1*s*. Drawing.]

A.D. 1862, November 29.—Nº 3209.

ANDERSON. JOHN.—"Improvements in the manufacture of "the tyres of railway wheels, and rails, switches, and crossings "of railways."

" This invention consists in causing them, when made of steel " or carbonized iron, to be heated to a good or bright red heat, " and then quenched or cooled by immersion in oil. By this " means the quality of the metal of which the railway tyres, " rails, switches, and crossings are composed, will be greatly " changed in character, and at the same time rendered more " suitable for use."

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 1.—N° 3214.

GRIFFIN, George Featherstone.—" Improvements in the " permanent way of railways."

" They consist in lowering the rail into the body of the sleepers, " using the curved or lateral arch of the sleeper to support the " rail on one side, and forming jaws or chair arms to support it " on the other, by which means greater strength is obtained, and " a larger bearing surface to prevent lamination of the rail; " further, the keys being placed inside, should one accidentally " become displaced, there would be no danger of the rail getting " out of gauge; recessing wood in the lateral arch and in the " keys in such manner that the wood assists in supporting the " rail under its head. (The key itself is supported on a shoulder " cast on the inside of the jaw, and therefore cannot be displaced " downwards.) Where wood is not used the rail is supported by " the lateral arch itself."

" Also, in conjunction with the improved sleepers, a saddle rail " having a convex curve on the under side is used, thus obtaining " a larger wearing surface with larger flanges. Further, the convex portion of the rail fitting into a concave bed prevents any " tendancy of the rail to roll or turn, and, together with the " system of wedging, does away with the necessity of using " bolts or screws."

" Another improvement consists in a safety rail formed by " bending it at a right or other sharp angle, and so forming it " with two running surfaces on one side. When this rail is laid " on the sleeper, and secured by wedging or otherwise, while one " of the angles forms the running surface, the other serves as an " edging or flange, and prevents the rolling stock or train from " leaving the rail. When one running surface is worn the rail " is turned, and it in its turn becomes the safety flange."

[Printed, 10*d*. Drawing.]

A.D. 1862, December 2.—N° 3233.

BOUSFIELD, GEORGE TOMLINSON.—(*A communication from Eugène Sneits.*)—(*Provisional protection only.*)—" Improvements " in forming the permanent ways of railways."

" According to this invention the sleepers or bearers are usually " placed transversely across the railway, and the rails are fixed " in chairs, which are fixed by bolts and nuts to the transverse " sleepers or bearers. The chairs may be either fixed directly to " the sleepers or bearers of wood or other suitable packing may " be interposed between the under surfaces of the chairs and the " upper surface of the webs, which comes between the flanges of " the double T or H angle iron of the bearers or sleepers, which " are laid in a horizontal position on the earth. In some cases " the use of chairs may be dispensed with, and the rails be laid " on and fixed directly to the sleepers or bearers of double T or " H angle iron, and for this purpose the flanges of the transverse " angle iron bearers may be cut away, or turned down at intervals, " or the spaces between the rails and the webs of the sleepers or " bearers may be filled with wood or other packing, so that the " rails may come above the flanges of the bearers or sleepers."

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 10.—N° 3250.

GRANT, JOHN.—" Improvements in the construction of turn- " tables for portable railways."

" The invention consists in a novel mode of constructing a " very light and portable turntable, so that it may be easily " moved from place to place, and very easily and quickly placed " in position upon the surface of the ground without requiring to " be let into it, and so that four-wheeled carriages or trucks may " be turned thereon so as to be brought at any required angle to " their former track, and in a line with any one of any number " of branch lines or turn-outs that may be radiating from the " centre of the turntable, so as to be turned completely round in " the direct track."

[Printed, 8*d*. Drawing.]

A.D. 1862, December 13.—N° 3339.

CORBET, CHARLES.—" Improvements in rails for railways, and " in the mode of forming the joints of the same."

" The invention consists in the use of a bridge rail made wider " at its upper part or head than at the lower part above the base, " the sides being curved inwards at each part and then curved " outwards to form the base. Into the hollow of this peculiar " rail there is fitted accurately a correspondingly shaped chair, " or chair and fish combined, which enters some little distance " into each end of the rail, the peculiar shape of which prevents " all chance of lateral or vertical motion at the joint." " It is " further proposed to form the chair or chair and fish with a " base-plate having raised ribs at each side, for the purpose of " preventing any expansion of the base of the rail, the edges " of the flanges of which abut against the raised ribs above " mentioned."

[Printed, 6*d*. Drawing.]

A.D. 1862, December 13.—N° 3343.

NEWTON, WILLIAM EDWARD.—(*A communication from William Henry Dunning.*)—(*Provisional protection only.*)—" An im" proved mode of and apparatus for repairing the rails, points, " switches, and other parts of the permanent way of railways."

" The object of the present invention is to mend or repair the " damaged portion of the rail and render it serviceable without " being obliged to resort to re-rolling or re-manufacturing the " whole rail, by cutting off the surface of the damaged part of the " rail and welding on to this part a flat piece of iron or steel of " suitable width and thickness, the operation being performed in " such a manner as to form a perfectly level surface from end " to end of the rail. As the welding operation requires a high " degree of heat, and as the web of the rail is thinner than the " tread, the web is liable to be knocked out of shape during the " welding process. To obviate this, the rail is supported during " the welding process in a pair of moveable jaws, which will be " made to clasp the web firmly and support the under side of the " tread. For bridge or hollow rails it may be necessary to employ " a projecting core piece in addition to the supporting jaws. It " will, of course, also be understood that points, switches, and " other irregular forms require special forms of apparatus, but " constructed on the principle of supporting the heated rail " under the blows of the hammer."

[Printed 4*d*. No Drawings.]

A.D. 1862, December 23.—N° 3428.

WHITLEY, JOSEPH, and BURTON, JOHN WATSON.—" Improvements in the construction of the permanent way of railways, " which improvements are also applicable to railway wheels."

" The improvements in the permanent way consist in the appli- " cation of a packing or cushion of wood, paper, or felt, between " the connecting plates or fishes for connecting the rails toge- " ther, and the rails. These cushions may be compressed and " chemically prepared as is well understood, to aid in their " preservation from the action of damp."

[Printed, 6*d*. Drawing.]

A.D. 1862, December 31.—N° 3482.

ADAMS, WILLIAM BRIDGES.—" Improvements in railways and " tramways."

" The improvements are in sleepers, rails, and fishes. The im- " proved metal sleepers are of a cast or wrought iron, in short " lengths, say two feet, more or less, so arranged that they " receive rails in a deep channel in which they are keyed or other- " wise fastened, the rails resting on the whole length of the " sleepers either on the upper and lower table, or on both com- " bined, with or without the intervention of wood, caoutchouc, " or other similar substances between the rail and sleeper; and " the rails, when single-headed, are to be rolled with recesses for " fishes, which may partly enter their sleepers, and the same " system is applicable to chairs placed on sleepers. In some cases " the sleepers are cast in the form of a T, with the chair bolted " on it so as to replace the wood sleeper in ordinary use."

" The improved brackets are of cast or wrought iron bolted " laterally to the rails, with a horizontal bearing surface for the " ballast or sleepers. The improved fishes are constructed of " unusual depth to support the rail joints, and with inside abut- " ments to the rail tables. The improved longitudinal timbers " are cut diagonally to bolt to the rails laterally."

" The elastic permanent way consist in applying continuous " longitudinal timbers on the ordinary cross sleepers, and placing " the rails on them in chairs or brackets over the hollow spaces, " with or without caoutchouc or similar substance."

[Printed, 1*s*. Drawing.]

1863.

A.D. 1863, January 7.—N° 65.

JOHNSON, John Henry.—(*A communication from Alcide Louis Joseph Huber*).—" Improvements in the permanent way of " railways."

" The invention consists in using lighter sleepers, whereby a " considerable saving of timber is effected, whilst the proper " stability of the way is retained by attaching on the upper sur- " face at those parts where the rails rest or the chairs are secured, " and which are most liable to decay, extra blocks of oak or " other durable wood of a sufficient length only to give a firm " support to the rails, or it is proposed to employ short blocks of " timber of the ordinary section of sleepers for supporting the " rails, or rails and chairs, and to connect these blocks by bars " of iron, which bars form the intermediate portion of the sleeper " between the rail bearing surfaces. It has been found that " ordinary wooden sleepers deteriorate rapidly at the rail bearing " portions, whilst the intermediate portion of the sleeper remains " comparatively sound, but it is necessarily lost or wasted by " reason of the decay in the other parts."

[Printed, 8*d*. Drawing.]

A.D. 1863, January 22.—N° 196.

GRANT, John.—" Improvements in the construction of sidings " and loop lines for railways or tramways, whether portable or " otherwise."

" The invention consists, in the first place, in two novel modes " of constructing a siding so that it may be placed in position at " any part of the main line, and on either side of it so as to be " used for turning carriages out of the main line on to such " sidings, or from the siding on to the main line by raising or sup- " porting such trucks or carriages above the rails of the main " line without the necessity for any cuts or gaps through such " rails. Secondly, in the combination of a pair of such sidings " connected by intermediate rails so as to form a loop line.

" The ends of the rails of the siding at the junction of the main " line are made to rest on or above the rails of the main line, and

" are of greater depth or thickness at the point of junction than " the depth of the flanges of the wheels, so as to admit of the " free passage of the wheels, including the flanges, over or above " the falls of the main line. In order to raise the wheels to the " level of the siding at the point of junction, or to lower them " from the siding, the rails of the siding are continued from such " point of junction a short distance along the tops of the rails of " the main line, and in the same direction but in a tapering form, " terminating in a thin edge so as to form a gradual incline from " the lower to the higher level upon which the wheels may be " made to ascend or descend."

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 27.—N° 236.

ASKEW, CHARLES.—(*Provisional protection only.*)—" An improved railway chair and joint for rails on railways."

" The chair is constructed in two parts, and each has a head " similar to the jaw of a vice, to fit the rail. One of such parts " has a sliding grove similar to the slide of a slide-rest of a lathe, " and the other has a sliding piece to fit and slide in such groove. " When a single or double headed rail is placed between the " jaws of the chair it is secured in the required position by means " of one or more bolts passed through one or more holes through " the two parts of the chair, and, if desired, through the rail also " for that purpose, and screwed up securely by means of one or " more screw nuts."

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 28.—N° 243.

BARLOW, HENRY BERNOULLI.—(*A Communication from Stieme Marechal*).—" Improvements in preserving timber, and in apparatus employed therein."

" This invention is particularly applicable to preserving railway " sleepers, but it may be employed for preserving timber for any " other purpose, and it consists in placing the timber in a closed " vessel from which the air is exhausted by suitable air pump " machinery, then subjecting it to the action of a metallic salt, " and then to the action of tar or other bitumnious substance.

" The apparatus consists of three or other convenient number " of vessels for containing the timber; the vessels are connected " together, and to two boilers, by suitable pipes, the whole being " capable of resisting a pressure of six or eight atmospheres. " The boilers are heated by a furnace or furnaces of the usual " construction, and one boiler contains a solution of sulphate of " iron or other metallic salt, while the other contains the tar or " other bitunimous substance, to which it is necessary to add " occasionally a certain quantity of mineral oil to keep the tar " fluid."

[Printed 10*d*. Drawings.]

A.D. 1863, February 13.—N° 396.

WHITAKER, Samuel.—" Improvements indicating the positions or conditions of railway signals and points, and in the " apparatus employed therein."

" It is proposed to connect railway points and crossings with a " battery, and with suitable contact surfaces, so that when the " point is open or closed, as the case may be, a circuit will be " established through a galvanometer, the needle of which will " indicate the position of the points in connection therewith. " The same arrangement is equally applicable for indicating the " position of the day signals. By providing any ordinary signal " with proper contact points, and connecting such points by wires " with a battery and galvanometer at an adjoining station or " intermediate point, the setting of the first signal is instantly " indicated by the needle to the signal man of the second signal."

[Printed 10*d*. Drawing.]

A.D. 1863, February 27.—N° 557.

DUDGEON, Arthur, and MEAKIN, George Frederick Lee, and ALLEN, Edward Ellis.—" Improvements in the " construction of underground railways or subways, and in carriages to be used or worked therein."

" The main objects of the invention are to avoid any lengthened " interruption of the ordinary traffic during the construction of

" such subways, to considerably reduce their height, and conse-" quently their cost, as also to avoid the possibility of any " settlement of the buildings standing along the sides of the " streets or roads under which the said works are being carried."

[Printed, 1s. Drawing.]

A.D. 1863, March 5.—N° 627.

HOWIE, John.—" Improvements in the construction of the " crossings of railways."

" The parts which are found to give way so much sooner than " the other portions of the line are those which are contiguous to " the tongue or point rails of the crossings. At these parts a " comparatively short length of rail is interposed in the line of " the ordinary rails and forming a continuation of the same. " These short lengths of rail are, by preference, formed of steel or " case-hardened iron, in order that they may wear as long, or " nearly as long as the rails which are subjected to the ordinary " wear and tear of the line, and are fastened by means of fish-" plates extending for some distance beyond the abutting ends of " the rails, and are firmly bolted together; a portion of the bolts " may be passed through both the rails, so as to obtain a very " firm junction, and prevent all rocking or lateral motion of the " rails; the fastening of the parts may, however, be effected in " various ways. In conjunction with these short lengths of hard " metal rails, it is proposed to make the extremities of the tongue " rails in short pieces, fastened by suitable chairs, and extending " backwards a length of four or five feet, and made by preference " of steel or case-hardened iron, so that these parts may wear in " unison with the continuous hard metal rails. Another mode of " arranging the short rails is to form them in two parts, the lower " portion of the rail being formed with a vertical web or feather, " and the upper half being of a saddle-like figure with a recess " corresponding to the mid-feather of the lower part. The upper " portion of the rail is slipped on to the lower one, and the two " are firmly secured by being bolted together by the fish joints. " This arrangement admits of the upper portion of the rail being " easily renewed from time to time when worn."

[Printed, 10*d*. Drawing.]

A.D. 1863, March 9.—N° 651.

LEA, Charles Henry.—" Improved apparatus for opening and " closing the gates of railway crossings, which apparatus also acts " simultaneously upon the signals."

" The invention is designed for the purpose of preventing " accidents at level crossings, and to enable one person by a " simple movement of a lever to open or close both gates, and at " the same time to set the signals on both the up and down lines " of the railway. These gates are mounted so as to turn upon " footsteps, and each gate is connected by a link to the outer end " of a lever capable of vibrating on a fixed centre. The inner " ends of each pair of levers meet in the centre, and are furnished " with slotted eyes, and they are all four connected together by " rods and links running along the six-foot way, so that they all " must act simultaneously. The outer end of one of the levers is " lengthened and is connected by a chain or chains to two hand " levers, one of which being depressed causes the gates all to open " simultaneously, and the other closes them in a similar manner. " By connecting the ordinary semaphore or other signals on the " up and down lines to the levers which work the gates by means " of chains passing round pullies, the opening of the gates (or " closing of them as regards the railway) will be caused to raise " the danger signals on both lines, a spring or weight bringing " the same down as soon as released by the closing of the gates to " the road."

[Printed, 10*d*. Drawing.]

A.D. 1863, March 28.—N° 809.

PERRY, Archibald Hewison.—(*Provisional protection only.*) —" Improvements in working railway points, switches, and signals, " and in the apparatus to be employed for that purpose."

" The object of this invention is to ensure to the pointsman or " signalman a correct knowledge of the condition of the points or " the signals (or both together when they are connected and " worked simultaneously).

" For the purpose of insuring the points or the signals being in " the position intended or due to the movement of the lever-" handle by the pointsman, although he may be at a considerable " distance from such signals and from the points, there are

" applied to each of the points, and to the face or edge of the rail " into which it is intended the point or tongue is to come in close " contact, a piece of copper or other suitable conducting metal, " and by insulating each piece of metallic conducting surface " from the rail or rails and connecting it by means of a wire with " a battery and telegraph instrument, and to the earth, the " perfected contact is signalled on the opening or closing of each " pair of points or switches. Thus it will be understood that " when the points are only partially opened or closed from some " defect in the apparatus, their actual condition will become " known, and the pointsman or signalman will become aware of " the unsafe condition of the points or the imperfect working of " the signalling apparatus."

[Printed, 4*d*. No Drawing.]

A.D. 1863, April 2.—N° 846.

LAW, JOHN WARREN, and INGLIS, JOHN.—" Improvements " in making moulds for casting, and in apparatus connected " therewith."

" This invention relates to the application of pressure in making " moulds for casting metals, and is applicable principally, " although not exclusively, to articles of a generally cylindrical or " spherical form, the improvements being such as to secure " increased accuracy of form with economy in the labour " required."

" In making a mould for the concave side of a railway sleeper, " or similar article, a convex perforated plate is used, with a rim " round its outer edge, and having a central hole. This plate " being placed with its convexity upwards a pin is fitted in the " central hole, and a frame of sufficient depth being fitted on the " rim sand is filled in, and what is superfluous is removed by a " scraper turning on the central pin; the whole is then brought " under the pattern and pressure applied to give the finishing " shaping action. The convex side of the sleeper with the chair " upon it may be moulded in a similar way, an additional double- " headed rammer being used to give the proper hardness to parts " of the mould. Ordinary railway chairs and other articles may " also be moulded in the same way."

[Price, 1*s*. 2*d*. Drawings.]

A.D. 1863, April 2.—N° 847.

CLARKE, Edwin Francis.—" Improvements in the means " of fastening rails for railways."

" The improvements relate to the construction of the chairs and " keys. The chair is formed with a vertical slot tapering down- " wards, and which is cut or formed in the inner faces of the " chair and extends through the bottom of the same. The keys " are each formed with a head, which fits on the side of the rail " and drops into a recess formed in the chair for that purpose, " and a vertical fin projecting from the outside and extending " downwards in such a form that when the keys are placed one on " each side of the rail the fins meet underneath, and on being " dropped vertically (in this position) into the chair, the fins ex- " actly fit and completely fill the taper vertical slot in the chair. " The heads of the keys are the same width as the chair, except at " the joint chairs, where they are made wider so as to act as fish- " plates."

[Printed, 8*d.* Drawing.]

A.D. 1863, April 15.—N° 946.

CLARKE, William.—(*A communication from Paulin Gay.*) (*Letters Patent void for want of final specification.*)—" Improve- " ment in apparatus for the transport of goods."

"The apparatus consists of a carriage or platform which may " be constructed of iron, and is furnished at the under part with " small rollers running on rails, which extend in all directions " throughout the storehouses, and wherever the merchandize is to " be conveyed, and especially along quays. These rails are made " portable and possess the advantage of only occupying the way " for a few minutes until the loading is completed, when they are " at once removed without trouble or expense. These rails con- " sist of a kind of ladder, the cross-bars of which are furnished " with iron hooks to prevent the sides from opening, and so to keep " the rails at an invariable width apart. The movable platform " will easily carry from one to two hundred tons of merchandize " in proportion to its size, which it moves about in mass with " great facility, especially if the rails be slightly inclined towards " the quay. The platform is set in motion by tackling fixed on " board the lighter, while a windlass placed at the back of the " platform, the rope from which is furnished with a hook for

" attachment to the apparatus, regulates its motion towards the " lighter. The platform is returned to its original position in the " store by simply winding the rope round the barrel of the wind" lass in the reverse direction."

[Printed, 4*d*. No Drawing.]

A.D. 1863, April 20.—N^o. 984.

HUGHES, Ebenezer William.—" Improvements in turn" tables, turn-bridges, and slips."

" The frame is composed of radial rods or bars fixed at their " inner ends to a central boss or nave, and at their outer ends they " pass through and are affixed in a circular ring, which is of " somewhat less diameter than the inner ridge or rail before " mentioned, of the fixed circular track, and they extend beyond " the outer circumference of the fixed circular track. There is " one such radial bar or rod in the space between each two neigh" bouring spheres of those which support the turn-table or turn" bridge. On each of these radial rods or bars are two wheels, " one to run on the inner circular ridge or rail, and the other to " run on the outer circular ridge or rail of the fixed circular " track. These two wheels turn freely and independently of each " other, and the circular frame between the fixed circular track " and the turn-table or turn-bridge is supported by them. On each " of the radial rods or bars is a wheel which turns freely on the " rod or bar, and is of a diameter equal or nearly so to the space " between each two neighbouring spheres, so that it touches one " or both of the two spheres between which it is placed, and it " will be turned in an opposite direction to that in which the " sphere in contact with it turns when rolling in the groove in the " fixed circular track. By applying to a turn-table or turn-bridge, " a combination such as is above described, the table or bridge " will not only be well supported, but it will be found to require " but small power to turn it, although the weight may be great. " In order to prevent accidents which might arise in the event of " a turn-table or turn-bridge not being in the proper position when " a train passes on to it, apparatus is applied for locking or " securing the turn-table or turn-bridge when brought correctly " into position, and signal apparatus is provided in order to indi" cate whether the turn-table or turn-bridge is properly arranged."

[Printed, 10*d*. Drawing.]

A.D. 1863, April 23.—N° 1007.

PROFFITT, John William, and DUNCAN, William Lundi. —"An improved mode and apparatus for distributing sand or "any other suitable substance or substances on the rails of rail"ways and tramways."

"Distributing sand so as to obtain a continuous biting power, and "to apply such sand or salt, or salt and sand, in case of frost or "snow or other substances being deposited upon the rails, in a more "convenient manner than hitherto, with a view to increase the "adhesion of the wheels of the locomotive, especially when "through the effect of frost or other causes they are sliding upon "the rails, or when it is required to assist the action of the break, "either to stop a train or to decrease the speed of the same, as "also to assist the trains getting up the inclines of railways.

[Printed, 8*d*. Drawing.]

A.D. 1863, April 23.—N° 1009.

RICHARDSON, Robert.—"Improvements in railway perma"nent way."

"The invention consists in new descriptions of railway sleepers "and a new method of fastening the rails in those sleepers. The "sleepers are constructed of cast and wrought iron or wood, or of "any or all of those materials, in combination with cheeks, jaws, "or chairs arranged in such manner that they receive keys placed "on both sides of the rails alternately, or two or more on each "side of the rails alternately, and by the assistance of those "cheeks, jaws, or chairs, on those sleepers, the rails are held firmly "in place throughout the line, including the joints of the rails, by "a system of alternate keeping. The next improvement consists "in new cast or wrought iron chairs or jaws to be attached to "sleepers of such form that the rails are secured by alternate "keeping, as before described."

[Printed, 2*s*. 10*d*. Drawings.]

A.D. 1863, May 8.—N° 1150.

SKWARCOW, Alexander.—(*A communication from Signore Rombeaux.*)—(*Provisional protection only.*)—"Improvements in "the construction of turn-tables."

"This invention consists, firstly, in bolting or rivetting lengths " of railway bars on the under side of the **H** iron bearers at the " point where the short pieces of the bearers butt against or are " connected to the long pieces, by which means the strength of " the cross bearers is carried through from one side to the other " and the bearers made continuous."

" Secondly, in forming the centre spindle on which the table " revolves of wrought-iron, and of such a form as to allow the " horizontal plane of the table to be out of the square with the " vertical axis of the spindle, without bringing any bending strain " on the spindle."

"Thirdly, in forming the oil cup or box in the same piece of " metal as the spindle, and in fixing in the centre of the oil cup a " steel stud, upon which rests another steel stud, which is fixed " to the wrought-iron cap of the table; by this arrangement the " surfaces of contact of these two steel studs are always working " in oil."

" And lastly, in connecting the circular rail with the casting of " the centre spindle by means of round wrought iron rods."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 9.—N° 1164.

NORIE, James.—" Improvements in making moulds for casting, " and in apparatus therefor."

"The said invention relates to an improved system applicable " in making moulds for casting combined sleeper chairs for rail" ways and other articles, and has principally for object to " economize labour, and to simplify and expedite the cycle of " operations."

[Printed, 10*d*. Drawing.]

A.D. 1863, May 10.—N° 1180.

VAN TENAC, Charles Louis.—(*A communication from Jean Arthur Granet.*—" A new wrought-iron railway sleeper."

"The principal object of the invention is a rolled wrought-iron " sleeper intended to replace the wooden sleepers on the railway " lines. It includes also :—

" 1st. The way of filling the inside of the sleeper.

"2nd. The way of fastening the vignole or Brunel rails on this "sleeper.

"3rd. The cast-iron chair wanted for using the double-headed "rails with this sleeper, and the way of fastening it on to the "sleeper.

"The sleeper is rolled in one piece, and filled inside either with "leson or sand agglomerated with lime, or with sand or clay so as "to obtain a solid body. The choice of material for filling the "sleepers to depend on the nature of the ground, or better to be "according to the cheapest way found in the country where it is "used."

[Printed, 7*s*. Drawings.]

A.D. 1863, May 19.—N° 1250.

EDWARDS, John.—(*Provisional protection only.*)—"Improvements in the permanent way of railways."

The patentee says,—"I fix suitable iron arms to the sides of the "rails by means of bolts and nuts, or bolts and cotters. These "bolts I make hollow to get extra strength. These bolts I apply "to fasten fish plates and other parts of the permanent way. "Under the arms I place a wood or other sleeper; the sleepers "pass between the stay and arms, which then hold them in position. Under the rail I pass a brace or stay, which is fixed to "the ends of the arms by bolts and nuts, or otherwise. Under "the rail, and inside the brace, I place a filling piece of any suitable material. When I use iron sleepers, which are made of "angle iron cut to length, I prefer to make the sleepers answer "the purpose of fish plates and sleepers combined. These "sleepers sometimes I form by carrying a thin plate of metal "from arm to arm; and to save metal for the arms, I use T iron "with holes punched to get the bolts in, but I do not confine "myself to this plan as the arms can be formed in many ways; "tie bars of wood or metal are passed under and bolted to the "sleepers: also I apply a capping to the rails; this capping is "rolled to fit the head of the rails, and is either bolted, sprung, "or forced on. This capping takes the wear of the rails, and it "is only requisite to renew the capping instead of the whole "rail."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 21.—N° 1269.

HARDING, George Rogers.—"Improvements in the means "of transmitting power on railways worked by vacuum or the "pressure of air, and in the apparatus to be employed for such "purpose."

"This invention consists of a novel arrangement of longitudinal "slots, and the valve or covering or means of affording communi- "cation between the piston in the interior of the tube and the "carriage or carriages exterior thereto, and of opening or closing "each longitudinal slot for the purpose of taking advantage of "the pressure acting upon the piston contained within the tube, "and closing the tube and leaving it in a condition ready to "be again employed after the passage of the piston in either "direction.

"Upon the exterior of the tube, and on each side of the longi- "tudinal slot, I cast or fix a bevilled flange, by which means a "V-shaped gutter or channel is formed over and along the "longitudinal slot, and which should be planed true from end to "end for the purpose of receiving V-shaped stoppers, which, "when hinged or connected together by a belt, strap, or web, "form a continuous but flexible bar, by which the longitudinal "V-shaped trough and the slot are closed air-tight by the "external pressure of the atmosphere against the internal "vacuum.

"The flexible bar or chain-like arrangement of pieces consists "of a series of metallic or other blocks, having a transverse section "corresponding with the V-shaped section of the trough or "channel, whilst they are bevilled in the direction of the length "of the tube, say, to some angle between the angles of 90° and "45 degrees, as may be found most convenient, these two bevilled "faces being parallel to each other. Each piece is hinged to the "next adjoining piece either by a link, bar, or equivalent means, "to admit of free motion upward or out of the grove, and they "are attached on their under face to an elastic band or web by "which the resilient and re-sealing action upon the longitudinal "grove or slot is effected; and, in like manner, there may be a "band or web extending longitudinally along the top of the "hinged pieces which form the continous flexible valve. Upon "the piston carriage is mounted a curved lifting piece or means

" of raising the flexible bar or valve out of the V-shaped grove, " so as to admit the atmospheric pressure behind the piston, at " the same time affording means of connecting the railway " carriage or train with the piston or piston carriage, or of communicating forward motion. By means of rollers attached to " the carriage the pressing down or re-sealing is effected."

[Printed, 8*d.* Drawing.]

A.D. 1863, May 23.—N° 1299.

HOPKINS, John.—(*Provisional Protection only.*)—" Improvements in points and in crossings used on railways and on tramways."

" These improvements consist in attaching to the thin edge of " the point rails a connecting piece of metal which lies between " them, each end of such connecting piece being secured to the " pointed end of the rails by a hinged joint; each of these joints " may be of cast or wrought metal, and each of them forms part " of a second hinged arm or joint, which projects from the point " rail; the joints at the ends of the arms are secured to studs projecting from a plate or plates attached to a sleeper or other " equivalent foundation; the plates and studs lie in the space " between the main rails. At or near the centre of the connecting " piece is a stud or lever which stands up above the top of it; this " stud or lever being actuated on one side will throw one point " rail towards one main rail, and the other point rail off the other " main rail. The movement of the stud and connecting link is " effected by means of a cam made in such form that, when it is " operated upon by the connecting link, as above described, the " point rails will be held in that position until the train, carriage, " or carriages have passed by or through it."

[Printed, 4*d.* No Drawings.]

A.D. 1863, May 26.—N° 1322.

MUNRO, James, and SCOTT, Robert.—" Improvements in " apparatus for boring, mining, and excavating or cutting, in " motive power engines, and in pressure gauges."

" This invention comprises various improvements relating to " boring and other mining operation, and excavations or cuttings,

" and, in part, applicable to steam or other motive power engines, " the object of the improvements being, generally, increased efficiency with simplicity of construction."

[Printed, 1s. 4d. Drawings.]

A.D. 1863, May 29.—Nº 1350.

LOEDER, WILLIAM.—(*A communication from Gabriel Dümler*). —" Improvements in rails for railways."

" The object of this invention is to economize on the cost of " permanent way by making part of the rail more permanent, and " the head not only more capable of resisting the shocks of the " rolling stock, but easily removeable when, from wear, fracture, " or other cause, it is found desirable to renew the surface or head " of the rail. The rail is, according to this invention, made in " two parts, the body and the head, or in more than two parts, " the body being itself sub-divided for the better securing it on " the sleepers, and the rail head on or into the body. By adopting this system, the head of the **T** rail (or head of other shape) is, " without material increase of cost, made of steeled iron or steel " itself, thus offering a resistance to shock and wear that iron " cannot pretend to, while the two parts of the rail body and head " can be laminated separately, making the head with double stem " and the body with a ridge, so that, when the head is received on " to the body, a bolt is passed through the stems of the head and " ridge of the body to secure the two parts together; or this may " be in a sense reversed, the rail head being made with one stem, " and the body with the receiving sides, forming, when in position, " plough and tongue, the tongue being formed with the rail head, " and the plough with the body thereof; a bolt or screw is passed " through to secure the parts in position, as previously mentioned, " or the body of the rail is made in separate (say two) parts, and, " when brought together to receive tongue or stem of the rail " head, the cavity below the stem of the head can be filled with " wood or other material, or the body can be formed with a ledge, " on which a portion of the under part of the rail head rests, while " the stem or tongue running partly down the body, which is " recessed to receive it, is fastened thereto by a bolt or other " fastening, and the parts can be manufactured to assume various " shapes or forms. Again, where desirable, two parts can be let

" into each other, and then brazed or soldered, but I prefer to use " bolts, screws, fish plates, or other rail fastenings well known and " in ordinary use, as such permit the rail head to be more easily " detached from the body in order to turn the other side of the " head to the wear from the wheels, or to remove the head altogether and replace it by another without removing the body " of the rail from its rest on the permanent way."

[Printed, 10*d*. Drawing.]

A.D. 1863, June 9.—N° 1432.

EDWARDS, John.—(*Provisional protection only.*)—" Improve" ments in railway chairs and sleepers.

The patentee says: " I take two or more suitable pieces of wood " and bolt or fix them together to get a sleeper of the requisite " size. I make a chair with a tongue-piece to insert between the " pieces of wood. This chair I sometimes make of wrought-iron " and cast-iron combined; the tongue and jaws I make of " wrought-iron and the sides of cast-iron, which are fixed to the " tongue. Sometimes I make the sides of wrought-iron and fix " them to the tongue; sometimes I use the wrought iron part " only, by fixing it either in the incision in the sleeper, or fixing " it to the sides of the sleeper. I pass a bolt through the tongue " piece, which holds the chair in its place. I also make suitable " incisions in solid sleepers; into these incisions the tongue " piece on the chair is passed and is bolted to the sleeper. I also " make a chair with a tongue piece; this tongue piece is hollowed " in the centre, so that when the rail is in the chair it bears on " the sleeper instead of on the chair. I also make chairs with the " edge of the bottom turned off to prevent cutting into the " sleepers. I use a split iron key to fasten the rails, putting wood " or some other elastic body between; sometimes I pass a screw " bolt through the side of the chair to fasten the rails."

[Printed, 4*d*. No Drawings.]

A.D. 1863, June 10.—N° 1441.

AITKEN, Russel.—(*Provisional protection only.*)—" Improve" ments in the permanent way of railways."

" This invention relates more particularly to a peculiar con" struction and arrangement of combined chair and sleeper,

" whereby the rail is held in its place in the chairs without the " aid of the usual wooden wedges. It is proposed to cast the " combined chair and sleeper in two parts, which are hinged " together by a hinge-pin running parallel or nearly so to the " rail, each half of the sleeper having a chair jam cast thereon. " The rail rests upon a wooden or other cushion inserted beneath " or at the side of the rail. The proper guage is maintained by " the usual or other wrought-iron tie bars, and jibs, and collars; " which latter serve also to keep the jaws of the chair firmly " against the sides of the rail. The weight of a passing train " tends to steady the rail by producing a powerful gripping action " of the jaws against the sides of the rail. Provision is made for " packing the sleepers from the surface through holes made " therein or otherwise."

[Printed, 4*d.* No Drawings.]

A.D. 1863, June 11.—N° 1454.

VAN TENAC CHARLES LOUIS.—(*A communication from Jean Arthur Granet.*)—" An improvement in railway wooden sleepers." " The principal object of this invention is a flat wrought-iron bar, " which by its peculiar make and the way of fixing it on the " wooden sleepers, makes the line perfectly secure and able to " resist a longer time than with the other wooden sleepers."

[Printed, 2*s.* 4*d.* Drawings.]

A.D. 1863, June 27.—N° 1614.

DUNN, THOMAS.—" Improvements in the construction and main- " tenance of the permanent way of railways."

The sleepers are made of " square plates of wrought or cast- " iron with the angles turned down into the ballast; jaws or " chairs are either welded or riveted on to hold the rails, or the " sleepers are made convex and concave, combined with or with- " out timber packings between the chair and the sleeper. These " packings are either triangular, square, semicircular, or cylin- " drical, and some of these packings form the tie bars for keeping " the rails to the proper guage. The under side of the chair " must be formed to correspond with the packings which are " made, so as to be easily removed when crushed or damaged. " The rail is fastened to the chair by an iron wedge or key, which

" is afterwards secured by molten lead or other suitable metal. " When chairs are secured to the ordinary wood sleepers, the bed " plate is made either circular or nearly square, in order to con- " centrate the area more directly under the rail, and the chair is " fixed to the sleeper by one bolt and two trenails, or two bolts " and one trenail; the trenails penetrate to a certain extent the " ordinary wood keep by which the rails are held in the chairs, " thus keeping them in their place when shrunk or damaged. " The improvements in the construction and maintenance of rail- " ways consist in the use of a combined machine called the 'plate " 'layers' steam companion;' it comprises a small locomotive " engine, with a crane and machinery for sawing, drilling, punch- " ing, bending, and pressing the wood and metal required in " constructing and repairing the permanent way."

[Printed, 7*s*. Drawing.]

A.D. 1863, July 10.—N° 1727.

JONES, William Edward.—(*Provisional protection only.*)— " Improvements in the permanent way of railways."

" This invention consists in making metal sleepers with a " spindle or shank, for the purpose of securely fixing the sleeper " to the ground. The spindle or shank is provided with a broad " screw, somewhat in the manner of a screw pile, for adjusting " the level of the rails. The sleeper is provided with a circular " groove or channel to receive the heads of screw bolts which " secure the chair to the sleeper, and when it is desired to adjust " the level of a rail these screw bolts are slackened, and the sleeper " with the screw shank or spindle is turned in the required direc- " tion until the desired adjustment is obtained, when the bolts " are screwed up and the rail is ready for traffic. Sometimes " instead of employing a circular groove or channel a number of " bolt holes are provided, so that the desired adjustment may be " obtained by turning the sleeper and screw shank or spindle to " the required extent, and then passing the bolts through these " holes which are then opposite the holes in the chair; or the " chair may be secured to the sleeper by a central pin or other- " wise, in order that the sleeper may be capable of turning " independently of the chair. The spindle or shank may be " made separate from the sleeper and secured thereto by rivetting " or other suitable means, or the spindle or shank may be made

" to turn independently of the sleeper. When laying rails according to the invention upon a foundation of wood, the screw " shank or spindle to the chair or sleeper will be of a smaller size " and somewhat of the character of an ordinary wood screw. The " spindle or shank may however in some cases be formed without " a screw, and would then simply require to be driven into the " ground."

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 10.—N° 1730.

CAMPBELL, JAMES. (*Provisional Protection only.*)—" Improvements in the permanent way of railways, and in supporting the " rails thereof."

" The invention consists in forming the rails with a very deep " web, and in constructing the supporting chairs and sleepers of " wrought and cast-iron combined. The latter part of the invention may be carried out in various ways, but it is preferred to " support the rails in a saddle made of cast-iron. The web of the " rail is made deeper than usual, so that it may have plenty of " lateral support, which will prevent it from getting out of guage. " This deep web is inserted into the saddle pieces, which are supported by and rest on dish-shaped longitudinal sleepers. If " desired, the saddle pieces may be divided into two pieces, each " of which will have a hooked piece to support the rail, or the " rails may be supported in wrought iron saddle pieces rolled to " suitable section to take the weld of the rail. In this instance " the saddle pieces and longitudinal bearers will be combined in " one piece, and may either be subdivided in lengths of convenient " size, or the combined chair and sleeper may be continued uninterruptedly under the rail throughout its extent. In order to " keep the rails in gauge, cross tie rods are used, as in other " systems of permanent way."

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 10.—N° 1731.

HAWTHORN, ROBERT, and HAWTHORN, WILLIAM.—" Improvements in the working of railways."

" This invention relates to a mode of working trains on rail" ways generally, and especially the trains on underground rail-

" ways or others by stationary engines; and it is proposed to
" place in the intermediate space between the two lines (of a
" double line) a series of double grooved sheaves fixed on spindles
" which pass under and across, near to the centre of each line of
" rails, each of these spindles having on opposite ends a wheel or
" roller. From a stationary engine placed in a convenient part
" of the line, an endless wire or other rope passes alternately over
" and under the grooved sheaves to the extremity of the line,
" where it is taken round a large loop sheave properly fixed, and
" returns, then passing over each sheave which it before passed
" under, and *vice versa,* the double groove providing for the rope
" crossing itself without contact. Having traversed twice along
" the line of sheaves, the rope passes again into the large drum of
" the engine, on which a sufficient number of turns are taken to
" ensure the requisite friction. By this arrangement of the rope
" on the sheaves it will be seen that every alternate sheave runs
" in the same direction, and this motion is conmunicated to the
" traction wheels or rollers. The traction carriage is made of
" such a length that the traction bars with which it is fitted extend
" over two or more alternate traction rollers, and it is furnished
" with the ordinary flanged wheels for running on the
" rails. The traction bars of which there are two, are placed side
" by side and worked either in connection with or independent of
" each other by a suitable arrangement of levers or other gearing,
" by which either of the bars can be raised or depressed, thereby
" bringing the weight of the carriage upon the traction wheels or
" rollers, thus giving motion to the train of carriages in either
" direction, or both these bars can be relieved from contact with
" the traction wheels or rollers, and the train left free from all
" tractive force. One of the traction bars being depressed while
" the other is raised, comes in contact with a pair of alternate
" traction wheels or pullies running in the same direction, the
" carriage and train attached to it being driven along the line in
" that direction by the adhesion between the traction bar having
" the weight of the carriage upon it, and the rollers with which it
" is in contact. If now this bar be raised and the other depressed,
" it comes into contact with another alternate set of rollers
" running in the opposite direction, and the motion of the
" carriage and train is reversed. The motion of the train can be
" quickly and certainly retarded or stopped by raising one bar

" and depressing the other in the manner of a brake, thereby
" reversing the direction of the driving motion."

[Printed, 8*d*. Drawing.]

A.D. 1863, July 11.—N° 1739.

GREAVES, Hugh.—" Improvements in the construction of rail-
" ways and tramways."

" The first part of this invention has reference to an improve-
" ment upon part of his Patent, dated the fifteenth day of May
" one thousand eight hundred and fifty-six, 'for Improvements
" in the Permanent Way of Railways,' and consists in the em-
" ployment of a metallic bush, in conjunction with the wooden
" bush there described, for the purpose of giving increased sur-
" face, and thus affording greater security of attachment between
" the chair and the sleeper."

" The second part consists of an improvement upon that part
" of his Patent, dated the twenty-eighth day of October one
" thousand eight hundred and fifty-nine, which has reference to
" an improved method of forming, moulding, and casting railway
" chairs and sleepers. The present improvement consists in so
" forming the pattern of the chair as that by a division thereof it
" shall leave its own cores for the formation of the trenail holes,
" and that instead of being cast, as hitherto, with the bottom side
" of the chair uppermost, it is cast with the jaws uppermost, and
" the bottom is thereby rendered more likely to be solid and free
" from sponginess or other unsoundness in the metal.

" The third part has reference to an improvement upon the form
" of tramway pipe described in his Patent, dated the fifth day of
" March one thousand eight hundred and fifty-seven, and con-
" sists in forming the groove or recess for the flange of the
" guiding wheel or wheels of the carriages travelling thereon at
" or near the edge of the upper surface of the pipe instead of at
" or near the centre thereof."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1863, July 15.—N° 1777.

TAMET, Dominique.—" Improvements in breakwaters, and in
" the construction of rail and other ways thereon."

" The object of this invention is to construct floating break-
" waters of wood (without masonry to support them) for the

" purpose of establishing small ports or harbours of refuge at any " point of the coast. They may also be used for the purpose of " protecting the mouths of rivers from the effects of heavy " weather, which renders the entrance or exit from such rivers " difficult."

"The advantage of this invention is the capability of placing at " any point this description of breakwater without the necessity " of submarine work other than securing the chains or the placing " of the anchors, which are for the purpose of giving to these " breakwaters, if not a complete immobility, at least a sufficient " rigidity to resist the wayes, and to break them in their passage."

"Another object of this invention is the application of this " arrangement of mole or breakwater to effect the establishment " of a railway, or other kind of road for vehicles or foot passengers, constructed on the same principal as the moles or breakwaters themselves for the purpose of uniting two shores or " banks."

[Printed, 8*d*. Drawing.]

A.D. 1863, July 23.—N° 1846.

MEISEL, Moritz.—(*A communication from Carl Schouberszky.*) —"An improved apparatus for regulating the speed of trains on " railways, and in assisting the locomotive engine and train in " ascending and descending inclined planes."

The invention consists in " the use and application of fly wheels " for equalizing the speed of railway trains whilst moving on " inclines, the axis of the fly wheels being put in motion by " friction wheels."

" The advantages offered by this apparatus consist in enabling " the engine to draw much heavier trains upon the existing railroads than has hitherto been the case.

"Secondly, the construction of new railroads with steeper " gradients without diminishing the length of trains. By admitting steeper gradients there will be a great saving in earthwork, bridges, viaducts, and tunnels, and the length of roads " can be shortened, so that the cost of construction would be " rendered cheaper. This apparatus has also the advantage of " modifying the velocity of a train in descending gradients and " facilitating the ascending of inclines."

[Printed, 10*d*. Drawing.]

A.D. 1863, July 27.—N° 1866.

BROOMAN, Richard Archibald. — (*A communication from Charles Marie Pouillet.*)—(*Provisional protection only.*)—" Im" provements in sleepers or supports for the rails of railways."

"The sleeper or support is a metal plate or table which is " secured by rivets to a T-shaped bar or rod. This bar " should be sufficiently rigid to resist the strain of a passing " train, and to maintain the perfect gauge of the line. The angle " iron placed under the table is optional; its object is to prevent " the slipping of the sleeper longitudinally. Upon each table is " fixed a support. This support is one of the chief features of the " invention; it is secured to the table by rivets, and may be more " or less raised above the table according as the table is more or " less sunk in the ground. On the upper part of these supports " is fixed a rail by bolts and keys, or a chair for receiving a " double-headed rail. To fix a rail with a broad base, a stop " secures it on one side, and a hook wedged in by a key on the " other. When a lower rib is employed the rail is secured by the " key."

Another method is " somewhat similar to that now in use for " wooden sleepers. A laminated metal shoe is used of about the " length and breadth of an ordinary wooden sleeper, with a rib " underneath and a swelling on its edges. Near each end of the " shoe, supports are attached by rivets for receiving the rail as in " the preceding case, the rails are secured by bolts and keys."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1863, August 6.—N° 1937.

DOWSON, Joseph Emerson.—" A new application of rolled " metal plates to the formation of roadways, bridges, tramways, " and other structures."

" This invention relates to the manufacture and use of rolled " metal plates of a trough-like section, having flat, concave, " convex, or otherwise formed soles or webs, with angular edge " plates or flanges along each side, or with a single flange, for " railway purposes, &c.

" The invention also relates to the application of the aforesaid " metal plates having a rail head formed thereon or fitted thereto " to the permanent way of railways or tramways, or as railway

" transverse or longitudinal sleepers. The ends of any of the plates " may be secured together by a lap joint, by a fishing plate, plain " or ribbed, by angle iron, or by the formation of flanges on their " ends, and by bolting, rivetting, or otherwise."

[Printed, 10*d*. Drawings.]

A.D. 1863, August 8.—N° 1966.

ARMSTRONG, JOHN WARD.—" Improvements in fastening " and in securing in position the rails of railways, the said fastening being applicable for other uses."

The patentee says, " For fastening the ends of rails together to " form a line of rails, or for joining other things where the same " kind of arrangements can be usefully applied, I use washer " fangs, such fangs being provided with recessed or dressed portions for the reception of the nuts on the end of the bolts which " pass through the bracket or half-chair part of the fish-plates " used for joining the ends of the rails. The nuts correspond to, " find fit in, the recessed or depressed portions, enabling the " screw bolt to work through without causing the nut to turn " round. For securing the rails in position, I adopt and apply " chairs, in which the rail is supported by the jaw of the chair, " against which it is firmly upheld and kept in position by the a " wooden key being driven in. In laying these chairs so as to " well secure the rails in position, one holding jaw of the chair " is placed on the right hand side of the rail, and the next holding jaw on the left hand side of the rail, and so on to the whole " extent of the line of rails, which arrangement produces practically the same effect as if the rail were caught on each side at " the same place, the necessity for through bolting being thus " avoided, whilst the wooden key being easily removeable, affording greater facility for repairs, and the lower table of the rail " being kept free from contact is not liable to wear. The wooden " key can be made to taper off well. The bolts may have a " running nut at each end, or a fixed head at one end and a running nut at the other end. The various parts may be galvanized, " and made so as to act well together."

" In using my improved washer-fangs to join rails together, I " should use a bracket, or sort of half-chair arrangement, to " which the rail is secured at the fish-plate joints, the base of this

" half-chair being bolted through and secured by the washer " fangs."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1863, September 8.—N° 2211.

JACK, James Deas.—" Improvements in moulding or shaping " metals."

" The invention relates to the application, employment, and " use of mechanical means and apparatus for effecting the ram- " ming of the sand in making metal castings in place of using " manual labour as heretofore."

" The machine is used for moulding the chairs ror supporting " railway bars, but it is also equally applicable for moulding of " other forms and construction of articles."

[Printed, 10*d.* Drawing.]

A.D. 1863, September 17.—N° 2280.

EDWARDS, John, and LIVESEY, James.—(*Provisional Protection refused*).—" Improvements in the permanent way of rail- " ways."

" The invention consists in putting suitable springs to carry " the rails to break the concussion, a suitable chair or sleeper is " formed, the springs being made to bear on the chair or sleeper " supporting the rail; also in forming suitable metal spring keys, " or metal and wood combined, to key up the rails instead of the " ordinary wood keys as now employed; a recess is made in the " metal key to prevent it shaking out; also a metal fastening " piece is employed in the combined metal and wood keys; also " in making a hollow metal spike of unwelding tubing or split in " the manufacture, the inside is made slightly irregular with the " bottom part turned in. When the spike is driven home, a " solid pointed spike is driven into the hollow one, forcing or " expanding the sides, and especially the bottom part, so as to " secure it firmly in the timber; also in forming a chair with a " suitable metal filling piece, between this metal filling piece and " the chair a spring is driven in, which tightens the rail; some- " times we insert between this metal filling piece and the chair a " wood filling piece, and then drive in a metal plug to tighten

" the rail; this wood filling piece we sometimes case with metal; " in this chair, for joints, we form two or more points or pro- " jections, which enter the holes in the ends of the rails, and " thus the rail is prevented from drawing out of the chair."

[Printed, 4*d.* No Drawings.]

A.D. 1863, September 21.—N° 2320.

ELSDON, William.—"An invention for the construction of " rail and road carriages and improved wheel tyres, and an " improvement in railway crossings, adapting them to such " carriages."

" First, the general form of a tire having a double running " surface adapted for wheels intended to be used either for rail- " way or road purposes, and in which the side of that portion of " the tire intended to be used for running on streets or roads will " act when the wheel is on the rail as a flange to the portion in- " tended to be used for running on the rail, and the application " of such tires or hoops to wheels for carriages intended both for " rail or road.

" Secondly, the adaptation of means of locking and unlocking " the frame of the forewheels to carriages intended for travelling " both on railways and on streets or roads.

" Thirdly, the use of an additional guard or check and wing " rails, and an additional tongue, and the sloping of the ends or " end of the same, and the adaptation of railway crossings, by means " of these assistants to wheels of carriages when fitted with such " tires or hoops, having on the inside of the tire the portion in- " tended for running on roads, so as to allow such wheels to run " over the crossings on railways, while, at the same time, per- " mitting engines, carriages, and trucks, and other vehicles " commonly used on railways, to run over such crossings in the " usual way without interruption."

[Printed, 10*d.* Drawing.]

A.D. 1863, September 21.—N° 2332.

VON KANIG, Wilhelm Adolf.—(*Provisional Protection only*).—" Improvements in railway teleraphs and signals, and also " in the permanent way and carriages for preventing railway " accidents."

"This invention consists, first, of a self-acting telegraph and " signals, by which the relative positions and progress of the " trains are indicated and regulated; secondly, of a train, tele- " graph, and signals by which a means of communication is pro- " vided between all the carriages and the guards and engine- " drivers; thirdly, of a guard rail and guide wheel by which the " trains are prevented from running off the line; and fourthly, " of a train guard or fender for removing impediments in front of " the trains."

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 29.—N° 2390.

GEDGE, William Edward.—(*A communication from Narcisse Antonin Brocot and Aime Labarre.*)—(*Provisional protection only.*) —" Improvements in parts of the permanent way of railways."

" The object of this invention is to more completely secure the " jointings of the rails of a railway, no matter what fish-plate or " chair be used."

" It is proposed to substitute in lieu of the two bolts nearest the butt ends of the rails an iron key with iron cottar or wedge. " This new method will give a rigidity to the joint which will not " be liable to become relaxed, the two rails will be more bound in " one than if tied by four bolts as usual, and if a rupture should " take place near the joint, the key would offer a resistance " against dislocation much greater than would the two interme- " diate bolts to be dispensed with, further to keep the two end " bolts from unscrewing, it is proposed to secure them by means " of a metal plate fitting on to the key, and with its two ends cut " so as to embrace two or more sides of the nuts of the two end " bolts. This plate being passed over the end of the key until it " lies with its two ends against the nuts of the bolts, a cottar or " wedge is passed through the key on one side the rail, and a " light and rigid joint is secured. It is proposed to divide the " end of the cottar or wedge, so that when it is passed through " the hole in the key, the two branches thus formed, may be " spread apart by any suitable tool, and the cottar be thus pre- " vented from shaking out under any vibration."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 7.—N° 2461.

JOHNSON, John Henry.—(*A communication from Miguel de Bergue.*)—(*Provisional protection only.*)—" Improvements in the " permanent way of railways."

" This invention consists in the employment of wrought or cast " iron transverse sleepers which are rolled or cast of a hollow " or trough shape on the under side. Or an undulated section " might be used so as to present three supporting points, the " main bearing being in the centre line of the sleeper. Some of " these sleepers are made to extend across the way so as to carry " both the rails, and between them other intermediate sleepers of " the same form, but shorter, are employed. The desired cant or " inclination of the rail is obtained in a certain and exact manner ' by bending downwards the longer sleepers, more or less, in the " centre, according to the degree of cant required. In securing " the flat-bottomed rail to these several sleepers, the tops or rail " bearing surfaces of which are made flat, it is proposed to em" ploy wrought or cast iron clips placed on each side of the lower " flange of the rail, the clips being served in such a manner as to " rest at one end upon the top of the sleeper, and at the other " upon the flange or foot of the rail. The clips are tightened " down upon the rail flange by means of screw bolts passing up " through the sleeper and through the clips, and secured by a nut " or key, or by rivetting them over the clips."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 12.—N° 2503.

AITKEN, Russel.—" Improvements in the permanent way of " railways."

" According to this invention the sleeper chair, which in general " outline may resemble the sleeper chair commonly known as " ' Greaves' pot-sleeper,' is cast in two parts, each part having a " chair jaw cast thereon, and provided with lugs on the inner " under surface, with a keyway or hole running through them, " parallel with and beneath the rail. The two halves of the chair " are tightened up against the opposite sides of the rail, and the " opposite halves of the sleeper are held together by driving a

“ key or keys into the keyway made in the lugs on each half of “ the sleeper. In order to obtain a certain amount of elasticity “ in the permanent way, the key or keys may be made of steel, “ and the lugs rounded slightly at those parts against which the “ key or keys bear. The guage is maintained by tie rods, the “ ends of which are inserted into sockets cast for that purpose “ upon the sleeper chair, and the same key or keys which secure “ the two halves of the sleeper chair together also pass through “ a slot near the end of the tie rod, and thus hold the chair at the “ proper guage.”

[Printed, 10*d*. Drawing.]

A.D. 1863, October 15.—N° 2525.

LESLEY, Peter.—(*A communication from Thomas Shoenberger Blair.*)—“ Improvements in the manufacture of rails for railways.”

“ The nature of this invention consists in combining the carbonization of a part of a railway bar with the subsequent rerolling of the whole rail while still hot, or after being re-heated.

“ In carrying out the invention, railway bars, either in the “ finished condition in which they are commonly laid down, or “ else in a condition not entirely finished, but requiring one or “ more passages through the finishing rolls, are packed in the “ pots of a converting furnace of ordinary construction for producing blister steel, where they receive carbonization by the “ well-known process. The packing with which the rails are “ surrounded may consist entirely of carbonaceous materials, only “ so much of it as surrounds the heads of the rails, whilst the “ rest of the surfaces of the rails are placed in contact with clay, “ sand, or other isolated non-carbonaceous material. The pots “ being filled with successive layers of rails and sealed up, heat “ is then applied as practised in the usual manufacture of blister “ steel, until the trial bars indicate that the desired degree of carbonization has been attained. The fire may be then extinguished and the furnace and its contents allowed to cool, and “ the rails afterwards removed in readiness for the next step of “ the process. But it is prefered to make the breasts of the pots “ removable at pleasure in sections, so that the rails may be with-

" drawn one by one while still at a sufficiently high heat, and im-
" mediately taken to and passed through the rolls until the blisters
" are reduced and removed, the surface rendered smooth, and the
" texture of the carbonized portion of the rail changed from that
" characterising blister steel to that characterising spring steel,
" that is condensed and toughened, after which the rails are
" straightened in the usual way and used."

[Printed 6*d*. Drawing.]

A.D. 1863, October 17.—N° 2548.

WRIGHT, JOHN.—(*Provisional Protection only.*)—" Improve-
" ments in machinery for cutting railway sleepers to receive rail-
" way chairs."

" The sleeper is fixed on a suitable bed or plate, which is
" arranged to slide or move on suitable rails or guides. Two
" pairs of circular saws are employed, one pair near each end of a
" sleeper, by which two pairs of parallel saw cuts are simulta-
" neously made in the sleeper. The wood between these saw cuts
" is next removed by two rotating adzes or cutters, one acting
" near each end of the sleeper. The recesses which are to receive
" the railway chairs are then completed by certre bits or rotating
" cutters acting simultaneously near the two ends of the sleeper;
" or, if the railway chair be suitably shaped, the whole of the
" recesses in the sleeper might be cut by means of revolving
" circular cutters."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 19.—N° 2556.

WHITLEY, JOSEPH.—(*Proisional protection only.*)—" Improve-
" ments in the permanent way of railways."

"These improvements consist of a sleeper made of cast malle-
" able iron, wrought iron, or steel, with or without flanges on the
" sides and ends, and with one or more ribs on the back, and with
" or without indentations on the upper surface to receive the
" chairs; the same to be cast, rolled, or struck in dies or blocks,
" as most convenient."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 24.—N° 2635.

ALISON, Alexander.—(*Provisional protection only.*)—" Im-" provements in atmospheric railways and in carriages for the " same."

" The invention consists in the use of an improved flexible " valve in the air tube of ordinary atmospheric railways, in the " novel construction of an atmospheric tunnel railway, and in " carriages, the latter being also applicable to ordinary railways " and tramways."

" The valve employed is constructed of gutta percha or other " flexible material, add is so formed that it is raised up by the " piston rod and returns immediately after the passage of the " same. The piston rod being constructed flat, will not open the " valve more than one-and-a-half inches, and as the pressure of " the atmosphere will keep the valve tight, very little external air " will enter the tube."

" The tunnel employed (when the tube is dispensed with) is " constructed of any suitable material, and convenient size, for " the passage of the train. Attached to the front of the first carriage of the train is a curtain or piston nearly filling a section of " the tunnel. This curtain or piston is constructed of metal or " wood, and moves on wheels with a guiding wheel running on a " rail at the top of the tunnel. Though attached to the carriage, " the piston is freed from the oscillation of the carriage to which " it is attached. To avoid any change, a piston may be attached " to the last carriage. One or more doors are placed in each " piston. By the opening of those in the front piston the " vacuum will be at once destroyed, and by keeping those in the " rear piston open, the passenger carriages of the train will be " continually supplied with fresh air. In addition to the ordinary " breaks, is used an accumulating power break, similar in form to " the main spring of a watch. This spring is fixed to the axle of " the carriages and is wound up by the revolution of the wheels " when it is desired to stop the train, and the accumulated force " is exerted against the wheels in starting. The doors in the " piston or curtain, as well as those communicating with the " stations, are hung on their centres to prevent slamming and for " convenience of opening. A stationary engine working large

" fans is placed at each end of the line and at such intermediate " points as may be found desirable."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 27.—N° 2658.

CARR, Mark William.—(*Provisional protection only.*)—" Improvements in the manufacture of wooden sleepers for railways."

" The sleeper is made with grooves across its upper surface of " such form and dimensions that the particular rails and keys to " be used may be securely and conveniently held in the grooves " very much as the rail and key are held in the jaws of the ordinary cast-iron chair. The grooves are more or less dovetailed in " their transverse vertical section, being wider below than above. " They are also of sufficient width to admit of the key or keys " being driven tight between the rail on one side of the groove. " The invention thus consists in attaching the rails of railways to " the transverse sleepers of wood by means of grooves and keys " without any assistance from chairs, spikes, nails, 'dogs,' screws, " trenails, straps, or other like contrivances."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 2.—N° 2710.

VANDENVINNE, Florent Joseph.—" Improvements in machinery for excavating land, making cuttings, and other earth" works."

" The machinery is intended to make cuttings in mountains " and hills for railways, roads, canals, or other works. For this " purpose a framework mounted on wheels and running on rails " is employed, this carries a small steam engine of sufficient " horse-power to work the apparatus. On the front part of the " frame are placed two vertical shafts in wrought iron, working in " bearings bolted to the frame, these shafts are furnished with a " number of arms carrying picks with steel points, they are fitted " and wedged to the shafts, and the picks are placed on the shaft " so as to form the blades of the helix or screw, so that only the " points of one set of picks of each shaft touch at the same time " the earth to be removed, and the sets of picks succeed each " other without interruption. These shafts work in opposite " directions, so that the picks cross one another continuously, and

" the arms on the upper ends of the shafts are longer than at the " lower ends so that they make in working a sloping cutting. " The shafts with the picks are actuated by gearing and driving " belts from the engine. This apparatus cuts and detaches the " earth and throws it into buckets fixed on an endless chain; the " buckets take the earth up to the top of the frame and empty it " down an inclined plane into waggons for removal; the frame is " worked forward by a shaft fitted with a screw working with " a worm-wheel on the axles of the carrying wheels, the whole " apparatus is thus moved forward so as to keep the picks " continually in contact with the earth."

[Printed, 10*d.* Drawings.]

A.D. 1863, November 4.—N° 2722.

LIVESEY, James, and EDWARDS, John.—" Improvements " in the permanent way of railways and fastenings for the " same."

" The invention consists of a railway chair or sleeper of either " wrought or cast iron plates, made at a suitable angle to fix to " the rails and fastened by bolts or other convenient fastenings. " A slot is made in the chair or sleeper, through which passes the tie-" bar to keep the road to guage, and in order to give strength to " the plates, a cotter is driven in, passing through the tie-bar, and " resting or binding on the plates; these chairs or sleepers can " form a combination of chair sleeper and fish plates; for the " latter, the plates are bolted with either four bolts in the usual " manner, or with three bolts; the centre bolt being made round, " square, or any other convenient form, passing immediately " through the joint of the rail, each end of the rail being slotted " or punched with a half round hole, so that when in position the " two slots or punches form a hole to receive the centre bolt; this " plan we adapt to any other form of fish joint. Also in a chair " or sleeper of cast iron, between the rail and jaw of the chair or " sleeper, a filling piece is inserted, so arranged that a spring or " other fastening can be driven in to secure the rail. Also in " making a hollow spike of iron or other suitable material to fasten " the chairs to sleepers; this spike is made hollow, with the internal " diameter diminishing towards the bottom, and is split in halves " about two-thirds of its length; when this spike is driven home

" a parallel spike is driven into the hollow one, forcing or expand-
" ing the sides and dovetailing it into the sleeper; this hollow
" spike may be made in two halves, if preferred. Also in making
" a wooden key with a metal strap fixed on one side, which is
" turned up after the key is driven in, and is thus prevented from
" shaking out of its place; these wooden keys we sometimes case
" with metal, to prevent decay or injury by insects."

[Printed, 1*s*. Drawing.]

A.D. 1863, November 5.—N° 2744.

BESSEMER, HENRY.—"Improvements in the manufacture of
" railway bars."

"This invention has for its object the utilization of the materials
" of which such old or worn wrought iron rails are composed by
" employing them in combination with pig or other carburet of
" iron, and thus remanufacturing the old rails in such a manner
" as to produce cast steel rails from the combination of wrought
" and pig iron so manufactured. For this purpose I prefer to
" use the converting apparatus generally employed in the manu-
" facture of cast steel by what is known as the Bessemer process.
" The second mode consists in giving a more perfect wearing
" surface on those rails that are manufactured by welding one or
" more steel slabs on to a pile of old rails or other puddled iron."

[Printed, 6*d*. No Drawing.]

A.D. 1863, November 13.—N° 2830.

REMINGTON, GEORGE.—(*Provisional protection only.*)—" Im-
" provements in atmospheric or pneumatic railways and loco-
" motive engines to be used in connection therewith."

The patentee says,—" I propose to use stationary steam or
" other power engines, placed at given intervals along the line of
" railway, and to have a tube or main, with a continuous vent or
" slit covered in the ordinary manner or otherwise.

" I also propose to construct a pneumatic engine, having a pair
" of cylinders as in a locomotive steam engine, but of larger dia-
" meter, with pistons, piston rods, and a crank or cranks to give
" motion to the driving wheels of such engine. The cylinders of
" the engine are to be connected together by a chest or air
" chamber, which is to be continually kept open with the atmo-

" spheric main aforesaid, and (by the regulation of the slide by the " eccentric action and gear as in the locomotive steam engine) " covering and uncovering the ports or inlets to the cylinders; " the difference of pressure between the external air and that in " the main is brought to bear on the pistons whereby locomotive " power of great force is produced."

"I further purpose, in some cases, instead of having a continuous slit along the main covered by plates, and leather " hinges, or bands, to have vents or valves at intervals, which " vents may be kept covered by valves to be raised and closed as " the locomotive engine passes over them; and the engine also " carries a slide box, two of the vents along the main being always " kept open to it and to the air chest of the locomotive engine. " In some cases I would employ disc valves to cover the vents or " openings along the main, in other cases slide valves, and in " other cases valves like the keys of a flute."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 18.—Nº 2881.

PRATCHITT, William, BLAYLOCK, John, and PRATCHITT, John.—" Improvements in and applicable to moveable " platforms for railway stations."

" This invention relates to an improved construction of moveable platforms for railway stations, and to the arrangement of " machinery for raising and lowering the moveable part of the " platform where cross roads for the passage of carriages or " traversers are required to intersect the platforms. The platform consists of a covered girder bridge, resting at the ends " upon moveable supports, and having upon the top rails similar " in gauge to those on the cross road. Under this bridge or " platform are placed one or more hydraulic cylinders, connected " either to pumps or to the service pipe of towns water when " there is sufficient pressure, so that upon withdrawing the " moveable supports, and allowing the water to escape from the " cylinder or cylinders, the bridge or platform may be lowered to " the level of the permanent way or traverser road, and allow the " passage of carriages or waggons over it; and when the water " is readmitted to the cylinders, the moveable part of the platform may be raised to the same level as the fixed part."

[Printed, 8*d*. Drawing.]

A.D. 1863, November 19.—N° 2968.

SYMONS, William.—" Improvements in the construction and " working of railways."

" The invention relates to an improved construction of railway, " and novel mode of propelling the carriages or trains thereon, " which mode of propelling is also applicable to existing railways. " According to one part of the invention, it is proposed to carry " railways through streets and other places where an embankment " will be objectionable upon and in open tubular or latticed " viaducts supported on suitable pillars, one line of rail being in " the tube or viaduct, and the other on the top of the same; or " if wheels be substituted for rails on one or both sides, wheels " will be suitably placed in and on the tube, and fixed at proper " intervals between the rails at a sufficient height to come into " contact with a bar attached to the under side of the carriages. " Motion is to be given to these wheels by having an hydraulic " engine connected wich each or some of these sets of wheels. " The water power will be conveyed by one or more main pipes " placed along the side of the rails, and connected with each " hydraulic engine by smaller branch pipes, suitable valves " worked by levers being so arranged that the carriages in their " progress will turn on and off the water of the engines as required, " or these valves may be worked by the trains through the " agency of electricity or hydraulic power. Instead of having a " bar or rail attached to the under side of the carriages with the " ordinary running wheels on each side, the carriages may be " constructed with wheels to run in a fixed rail on the one side " and a bar as a substitute for wheels on the other side to run on " the fixed wheels rotated by the hydraulic engines; or the " carriages may be made without wheels, and rest on two such " bars with suitable flanges moving on sets of two fixed wheels, " in which case fixed rails will be dispensed with."

[Printed, 10*d*. Drawing.]

A.D. 1863, December 2.—N° 3038.

CAMMELL, Charles, and CROMPTON, Willoughby.— " Improved railway crossings adapted to the ordinary single or " double-headed rails."

"The chief feature of novelty in these improved railway crossings consists in forming or casting the three ordinary bearing chairs in one piece, so as to give continuous support throughout for the entire length of the block or piece to both the wing and point rails, thereby ensuring an exceedingly strong, simple, and durable crossing. By this arrangement or construction of support for the points or crossings no bolt or fastening will be required beyond the usual wooden keys to hold down the rails or secure the chairs. The forms of rails used are of the ordinary kind, as are also the forms of the chairs to suit them. The invention may be carried out in various ways, and the mode of fitting or securing the rails in the chairs may to some extent be left to the discretion of the engineer of the line, provided the essential feature of the invention be retained. We would also observe that either iron or steel rails, or iron rails with steel points may be used."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1863, December 11.—N° 3122.

SEATON, CHARLES.—(*Provisional protection only.*)—"Improvements in the permanent way of railways."

"This invention consists in constructing longitudinal wrought or cast iron sleepers of a rectangular, semicircular, or other convenient section, laid with their apices or convex surfaces upwards, and having their corresponding concave surfaces bedded in the ballast. The rails are of course made so as to fit the surface or ridge of the sleeper, whether such surface be rectangular, semicircular, or curved; and, if desired, a cushion of timber or other suitable material may be placed between the rail and the sleeper to deaden the noise and prevent jarring. Other timber blocks are placed inside the sleeper, through which the bolts employed for securing the rail to the sleeper are passed. It is also proposed to make a longitudinal groove or channel along the top surface of these sleepers, and to insert a piece or pieces of timber therein of such a section as to fit the groove or channel in the top of the sleeper, the rail resting upon the timber. According to another modification the lower part of the rail is inserted into the interior of the sleeper, leaving the head only projecting above the surface of the sleeper, suit-

" able blocks or bolts being employed for tightening and securing " the rail in its place."

[Printed, 4*d.* No Drawings.]

A.D. 1863, December 11.—N° 3135.

PRATT, William Thomas Cassel.—(*Provisional protection only.*)—" A new method of and apparatus for enabling the points " on railways to be shifted by an attendant in the train while the " train is in motion."

" The invention consists of an iron plate or bar fixed in a frame, " at the centre rising above the surface, gradually sloping off at " the ends, having a weight attached to one end resting on a " block to prevent jar in the rise and fall. This plate or bar is " attached by a crank to an iron rod; the other end of the iron " rod acts by means of another crank upon a shifting rail, between " which and the main rail is a groove to receive stones and other " obstructions which might otherwise impede the motion or prevent its action. Connected with the engine, trucks, and carriages is a small wheel or wheels under the control of the " engine driver or guard by means of a handle. When it is required to move the train to a siding or to another line, the " guard, if the train is being backed, or the engine driver if it be " going forward, by moving the handle attached to the small " wheel or wheels will cause pressure to be made on the iron " plate or bar, which, by means of the rod, opens the shifting " rail; after the train has passed the rail will return to its former " position."

[Printed, 4*d.* No Drawings.]

A.D. 1863, December 16.—N° 3182.

FELL, John Barraclough.—" Improvements in railway " engines, carriages, and permanent way for steep inclines."

" The invention consists in the use of wrought-iron centre or " traction rails, fixed on wrought-iron chairs, and in the use of a " wrought-iron rail with flanges in combination with horizontal " traction wheels without flanges, and consists in the use of " wedges actuated by screws to compress the horizontal traction " wheels against the rail."

[Printed 2*s.* Drawings.]

A.D. 1863, December 18.—N° 3191.

ALISON, Alexander, and HALLIWELL, James.—(*Provisional protection only.*)—" Improvements in atmospheric railways."

" These improvements relate chiefly to the novel construction " and arrangement of the valve on the air tube, and mode of " operating the same; to the use of a double piston, and to the " means employed for stopping the train at the stations, or any " other points on the line. The valve extending the whole length " of the tube is composed of short, bent, or trough-shaped plates " or links, and for this reason is designated a 'chain valve.' " These plates may be secured together by means of a band or " sole of leather, or other suitable material, which band will " effectually prevent the passage of air from or into the tube. " The ends of the plates which form socket or hinged joints may " be fastened together by means of pins if found desirable. " The plates or links forming the valve are constructed with " the longitudinal trough-shaped openings upon their upper " surface."

[Printed, 4*d.* No Drawings.]

A.D, 1863, December 24.—N° 3267.

BROOMAN, Richard Archibald.—(*A communication from Charles Ferdinand Zorès.*)—" Improvements in the permanent way " of railways."

" This invention consists in constructing iron railway sleepers " of any or all of the forms represented in section in the accom- " panying drawings; these sleepers may be laid either in the " position shewn or inverted, and before or after laying them it is " preferred to ram ballast into the hollow parts, and fix a plate on " each end of the sleeper to prevent the ballast working out. The " manner of securing the rails to these sleepers will vary according " to the form of rail employed; where chairs are required, they " must be of such shape as will correspond to the shape of the " sleeper to which they are fixed."

[Printed, 2*s.* 4*d.* Drawings.]

A.D. 1863, December 28.—N° 3276.

BILLUPS, Jonathan Edwin.—(*Provisional protection only.*) —" Improvements in the permanent way of railways."

" The keys are so formed as to effect the combined purposes of " suspending the rail free from contact with the chair, and effec- " tually preventing the tilting up of one end of the rail when the " load is bearing on the opposite end; the tilting up of the " opposite end of the rail is prevented by lugs cast on the chair; " the suspending and holding down keys are hollow and made of " wrought iron and other metal, and are split longitudinally. " This key can be applied to any arrangement of chair. Wooden " keys and metal hollow keys may be used in conjunction with " each other. A cushion of wood, india-rubber, or other suitable " material may be fixed in a recess at the bottom of the chair; " one of the keys in each chair may be so fixed as to prevent " its having any longitudinal motion, the other key being driven " in the ordinary manner. That part of the chair upon which " the latter key acts is made sufficiently convex to admit of the " key being driven home, and prevent its working out. The " fixed key may, by this arrangement, be placed alternately on " the outer and inner sides of the rails, so as to ensure the rail " always being held in position should the driven keys work out; " or the keys may be both fixed in recesses in the chair, thereby " preventing their coming out; but in either case it would effec- " tually suspend the rail, and prevent the tilting up of the same. " The chairs may be made of rolled wrought iron, cast iron, or " cast malleable iron. These improvements may all be applied to " a chair and sleeper combined, whether made of cast or wrought " iron, or in one or more parts."

[Printed, 8*d*. Drawing.]

A.D. 1863, December 30.—N° 3299.

HOUDAYER, MAXIME CHARLES EDOUARD, and CORMIER, JULES JEAN.—(*Provisional protection only.*)—" An improved " apparatus to be attached to locomotive engines for the purpose " of removing obstructions from railways."

" The apparatus consists of two strong cheeks of sheet iron, or " other suitable resisting material, connected together on a suit- " able iron frame fixed to the beams and the buffer or cross bar of " the engine; the said cheeks form a sort of protruding wedge, " the angle of which is situated in the prolongation of the axis " of the engine, the faces of the wedge forming either straight

" or suitably curved inclines both in the vertical and horizontal " direction, whilst the two free ends of the wedge extend sufficiently far beyond the rails, the lower edge of both cheeks " nearly reaching these latter, which lower end is bent up into " the horizontal direction so as to act in the manner of a shovel " for lifting any obstacles existing on the track in front of the " engine, and throwing them aside. The free end of each cheek " may be prolonged parallel to the outside of the locomotive."

[Printed, *4d.* No Drawing.]

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- De Bac, 25.
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- Deville, 31.
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ERRATA.

Page 15, top line, *for* "May 10" *read* "May 21."

Page 20, line 18 from bottom, *for* "Wilkinshaw" *read* "Walkinshaw."

Page 29, line 8 from top, *for* "Bac, Pierre Barthelemy Gunibent de" *read* "De Bac, Pierre Barthelemy Guinibert."

Page 30, line 8 from bottom, *for* "Wordsell" *read* "Worsdell."

Page 32, line 4 from bottom, *for* "Wart, Henry Van" *read* "Van Wart, Henry" and *for* "Aspinall" *read* "Aspinwall."

Page 40, line 14 from bottom, *for* "Isace" *read* "Isaac."

Page 47, line 7 from top, *for* "Robinson" *read* "Robison."

Page 54, line 14 from top, *for* "Crawshaw" *read* "Crawshay."

Page 56, line 12 from top, *for* "Drouot" *read* "Drouet."

Page 78, line 8 from top, *for* "Nesbit" *read* "Nisbet."

Page 80, line 6 from top, *for* "Berque, Charles de" *read* "De Bergue, Charles."

Page 90, top line, *for* "April 1" *read* "April 6."

Page 90, line 17 from bottom, *for* "April 29" *read* "April 28."

Page 102, line 4 from bottom, *for* "December 24" *read* "December 21."

Page 105, line 5 from bottom, *for* "Percival" *read* "Perceval."

Page 110, line 18 from bottom, *for* "Augustine" *read* "Augustin."

Page 123, line 12 from top, *for* "Percival" *read* "Perceval."

Page 129, line 16 from bottom, *for* "Bowelsby" *read* "Bowlsby."

Page 139, line 19 from bottom, *for* "Day, Charles Frederick," *read* "Day, Charles Frederick, and Laylee, John."

Page 149, line 2 from top, *for* "Perks" *read* "Perkes."

Page 184, line 7 from bottom, *for* "Percival" *read* "Perceval."

Page 201, line 13 from bottom, *for* "June 29" *read* "July 29."

Page 206, line 5 from bottom, *for* "Harfrey" *read* "Henfry."

Page 224, line 4 from bottom, *for* "Livingstone" *read* "Livingston."

Page 225, line 13 from bottom, *for* "Jeffreys" *read* "Jeffreys, Edward."

Page 256, line 2 from top, *for* "Percival" *read* "Perceval."

Page 264, line 15 from bottom, *for* "Colbourne" *read* "Colborne."

Page 278, line 2 from top, *for* "Percival" *read* "Perceval."

Page 285, line 6 from top, *for* "Shaud" *read* "Shand."

Page 292, line 3 from bottom, *for* "Gibbon, Abraham Fitz," *read* "Fitz-Gibbon, Abraham."

Page 310, line 7 from top, *for* "Romain" *read* "Romaine."

ERRATA.

Page 322, line 2 from top, *for* " Percival " *read* " Perceval."

Page 322, line 16 from bottom, *for* " Stettineas " *read* " Stettinius."

Page 327, line 5 from bottom, *for* " Gratiau " *read* " Gratian."

Page 331, line 13 from top, *for* " Vittoria " *read* " Vittorio," and line 12 from top, *for* " May 4 " *read* " June 4."

Page 355, line 12 from top, *for* " Brown " *read* " Browne."

Page 358, bottom line, *for* " Jacques " *read* " Jaques."

Page 360, line 14 from top, *for* " Hansfield " *read* " Stansfield."

Page 376, line 17 from top, *for* " October 9 " *read* " October 19."

Page 393, line 7 from top, *for* " Robert " *read* " Roberts."

Page 398, line 9 from bottom, *for* " June 1 " *read* " June 21."

Page 417, line 12 from bottom, *for* " McGantey " *read* " McGauley."

Page 435, line 2 from top, *for* " Rymes " *read* " Rymer."

Page 436, line 13 from bottom, *for* " 1668 " *read* " 1688."

Page 438, line 8 from bottom, *for* " Rey, Jean " *read* " Jean-Matthieu Rey, junior."

Page 444, line 4 from bottom, *for* " October 21 " *read* " October 23."

Page 446, line 10 from bottom, *for* " Alexander " *read* " Abraham."

Page 447, line 18 from bottom, *for* " Frazer " *read* " Fraser."

Page 456, line 9 from bottom, *for* " April 4 " *read* " April 3."

Page 463, line 15 from bottom, *for* " Preston, Frederick Philip " *read* " Preston, Frederick Philip, and Goodman, Charles."

Page 464, line 15 from bottom, *for* " Hazeltine " *read* " Haseltine."

Page 465, line 20 from bottom, *for* " Jefferies " *read* " Jeffries."

Page 475, line 14 from bottom, *for* " A.D. 1860 " *read* " A.D. 1862."

Page 480, line 17 from bottom, *for* " December 10 " *read* " December 4."

Page 489, line 20 from top, *for* " Clarke " *read* " Clark."

Page 492, line 7 from bottom, *for* " May 10 " *read* " May 11."

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3. A Commission directed to Sir Richard Wynne and others to inquire upon oath whether NICHOLAS PAGE or Sir NICHOLAS HALSE was the first inventor of certaine kilnes for the drying of malt, &c. &c. (*Letters Patent, Nos.* 33 *and* 85, *respectively dated* 8*th April* 1626, *and* 23*rd July* 1635.) Price 2*d*.; by Post, 3*d*.

4. **Dud Dudley's Metallum Martis**; or iron made with pit-coale, sea-coale, &c. (*Letters Patent, Nos.* 18 *and* 117, *respectively dated* 22*nd February*, 1620, *and* 2*nd May* 1638.) Price 8*d.*; by Post, 9*d.*
5. Description of the nature and working of the Patent Waterscoop Wheels invented by William Wheler, as compared with the raising wheels now in common use. By J. W. B. Translated from the Dutch by Dr. Tolhausen. (*Letters Patent, No.* 127, *dated* 24*th June* 1642.) Price 2*s.* by Post, 2*s.* 2*d.*
6. An exact and true definition of the stupendous Water-commanding Engine, invented by the Right Honourable (and deservedly to be praised and admired) Edward Somerset, Lord Marquis of Worcester, &c. &c. (*Stat.* 15 *Car. II. c.* 12. *A.D.* 1663.) Price 4*d.*; by Post, 5*d.*
7. Navigation improved; or the art of rowing ships of all rates in calms with a more easy, swift, and steady motion than oars can. By Thomas Savery. (*Letters Patent, No.* 347, *dated* 10*th January* 1696.) Price 1*s.*; by Post, 1*s.* 1*d.*
8. The Miner's Friend; or an engine to raise water by fire, described, &c. By Thomas Savery. (*Letters Patent, No.* 356, *dated* 25*th July* 1698, *and Stat.* 10 *&* 11 *Will. III. c.* 31, *A.D.* 1699.) Price 1*s.*; by Post, 1*s.* 1*d.*
9. Specimina Ichnographica; or a brief narrative of several new inventions and experiments, particularly the navigating a ship in a calm, &c. By John Allen, M.D. (*Letters Patent, No.* 513, *dated* 7*th August* 1729.) Price 8*d.*; by Post, 9*d.*
10. A description and draught of a new-invented Machine for carrying vessels or ships out of or into any harbour, port, or river against wind and tide, or in a calm, &c. By Jonathan Hulls. (*Letters Patent, No.* 556, *dated* 21*st December* 1736.) Price 8*d.*; by Post, 9*d.*
11. An historical account of a new method for extracting the foul air out of ships, &c., with the description and draught of the machines by which it is performed, &c. By Samuel Sutton, the Inventor. To which are annexed two relations given thereof to the Royal Society by Dr. Mead and Mr. Watson. (*Letters Patent, No.* 602, *dated* 16*th March* 1744.) Price 1*s.*; by Post, 1*s.* 1*d.*

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